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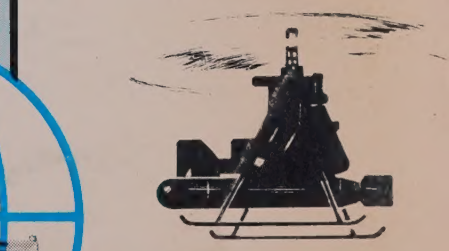
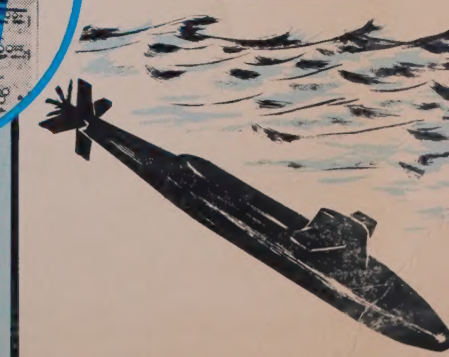
Babcock AEROSPACE a division of
BABCOCK ELECTRONICS CORPORATION

BSG-17R
SIGNAL GENERATOR

OPERATION AND MAINTENANCE INSTRUCTIONS





METROLOGY

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JANUARY 1964

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METROLOGY

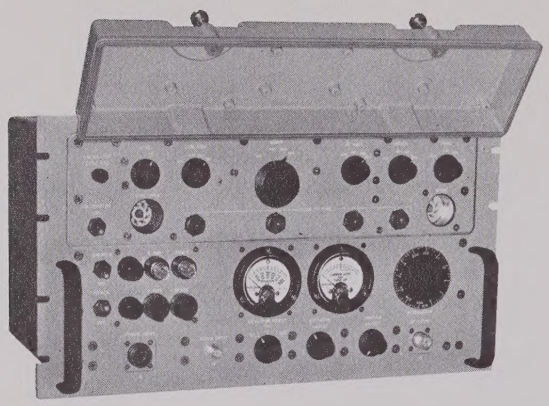


Figure 1 BSG-17R

SECTION I
GENERAL DESCRIPTION

The BSG-17R Signal Generator is a rugged, light-weight, all-solid-state, crystal-controlled test generator producing precise f-m signals in the 406 to 550-megacycle range. The unit mounts in a standard, 19-inch rack and operates from either 115 volts a-c or 27.5 volts d-c power.

External signals between 300 and 80,000 cps modulate the r-f output frequency of the BSG-17R up to a total deviation of ±300 kilocycles. The output amplitude is continuously variable from 1.0 to 100,000 microvolts. The output carrier frequency is controlled by plug-in, oven-heated crystals yielding a carrier frequency accuracy of ±0.005%. This accuracy may be verified easily through simplified front panel calibration with the local reference crystal oscillator. Deviation calibration is provided on 300 kc and 150 kc ranges by use of external audio frequencies of 15.45 kc (IRIG channel 7) and 7.50 kc (IRIG channel 1).

Two crystals per oven allow rapid switching from one frequency to another. A spare crystal oven socket allows two additional crystals to be maintained at operating temperature. Stand-by features are provided so that crystal ovens may be left on with all other power removed.

All operating controls and indicators are located on the front panel of the BSG-17R. The frequency determining controls and plug-in ovens are located under an access cover on the front panel. Connection of power input, audio input, and r-f output may be made to either the front panel or rear of the chassis.

While providing frequency accuracies of a laboratory standard, the BSG-17R is built to with-stand rigorous environmental conditions.

TABLE I SPECIFICATIONS

Frequency range	406 to 550 mc
Frequency accuracy	±0.005%
Output level	1.0 to 100,000 microvolts
Output impedance	50 ohms (nominal)
Output level accuracy	±1 db (0°C to +55°C)
External modulation	300 to 80,000 cps, 1.5 vrms
Audio input impedance	500 ohms
Modulation deviation	0 to ±300 kc (0-50, 0-150, 0-300 kc)
Output system	Calibrated attenuator, carrier level meter, deviation meter.
Power requirements	115 vac, 50 to 60 cps at 200 va; 115 vac, 380 to 420 cps at 200 va; 27.5 vdc, 3.0 amps max. (Relay provides automatic d-c precedence with both a-c and d-c sources connected.)
RFI control	MIL-I-6181D spurious signals -40 db
Dimensions	19 x 10-15/32 x 12-5/16 (inches)
Weight	45 lbs max.
Environmental	Specification MIL-T-21200, Class 3
Accessories supplied	A-c power cable assembly
Accessories available	R-f crystals in any combination of two,in plug-in ovens. 20-channel external coder (BCC-6E). D-c power cable assembly. Portable transit case.

SECTION II

INSTALLATION AND OPERATION

2-1 UNPACKING Observe all unpacking instructions on shipping container. Check packing material carefully for small items and mounting hardware.

2-2 INSTALLING Observe the Outline Dimensional (figure 2) for installation dimensions. Insure that sufficient space is allowed for front and rear panel cable connections.

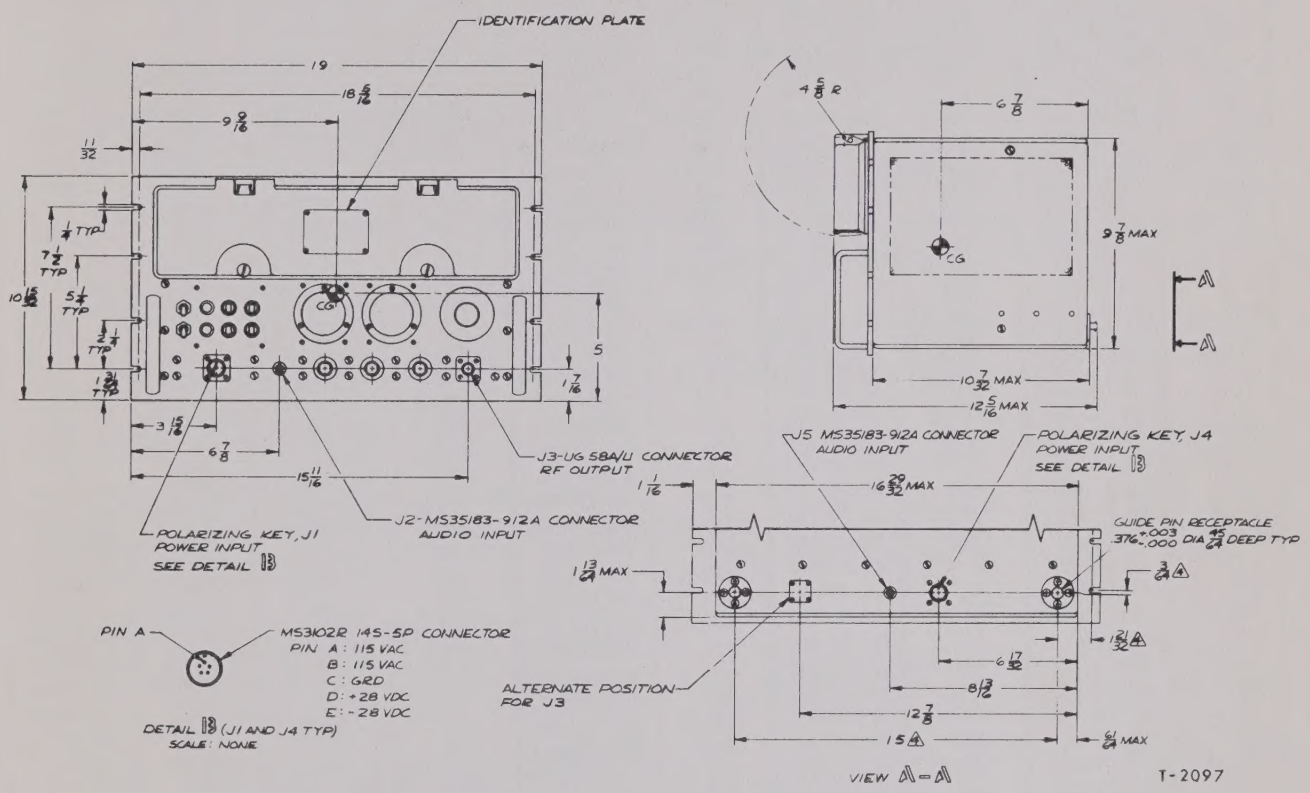

IDENTIFICATION PLATE
J3-UG 58A/U CONNECTOR RF OUTPUT
J2-MS3518 3-912A CONNECTOR AUDIO INPUT
POLARIZING KEY, J1 POWER INPUT SEE DETAIL B
J5 MS3518 3-912A CONNECTOR AUDIO INPUT
POLARIZING KEY, J4 POWER INPUT SEE DETAIL B
GUIDE PIN RECEPTACLE .376 +.003 -.000 DIA 45/64 DEEP TYP
ALTERNATE POSITION FOR J3
PIN A
MS3102R 14S-5P CONNECTOR
PIN A: 115 VAC
B: 115 VAC
C: GRD
D: +28 VDC
E: -28 VDC
DETAIL B (J1 AND J4 TYP)
SCALE: NONE
VIEW A-A
T-2097

Figure 2. Outline Dimensional.

2-3 PRELIMINARY OPERATING PROCEDURE The following procedures are to be performed on the BSG-17R prior to normal operating procedures. Applicable portions of the procedures outlined below can be performed as required during normal operation or for troubleshooting purposes.

Selection of Operating Frequency

a. Select proper crystal for desired operating frequency from formula given below. See table II.

$$\text{Frequency (Crystal)} = \left[\frac{\text{Frequency (Desired)}}{8} - 6.1\right] \text{MC}$$

b. Insert selected crystal in crystal oven and install in socket marked XTAL OVEN on BSG-17R front panel.

c. Set the XTAL switch to the position corresponding to crystal oven positions 1 or 2.

Application of Power

a. Connect accessory power cable (BEC 113865) to either J1 or J4 of BSG-17R and 115 volts ac source of power. For d-c operation of BSG-17R, use power cable BEC 113866.

b. Place POWER/OFF switch in the POWER position. Note illumination of red indicator light.

c. Place the CARRIER/OFF switch to the CARRIER position. Note illumination of the amber indicator light.

d. Allow unit to warm up for 20 to 30 minutes before attempting tune-up procedure.

Calibrator Adjustment

a. Adjust DEVIATION ADJUST control to fully CCW position.

TABLE II. OPERATING R-F FREQUENCY VS. CRYSTAL FREQUENCY

Desired R-F Oper Freq (In MC)	Crystal Freq (In MC)	Desired R-F Oper Freq (In MC)	Crystal Freq (In MC)	Desired R-F Oper Freq (In MC)	Crystal Freq (In MC)	Desired R-F Oper Freq (In MC)	Crystal Freq (In MC)	Desired R-F Oper Freq (In MC)	Crystal Freq (In MC)
406	44.65000	435	48.27500	464	51.90000	493.5	55.58750	522.5	59.21250
406.5	44.71250	435.5	48.33750	464.5	51.96250	494	55.65000	523	59.27500
407	44.77500	436	48.40000	465	52.02500	494.5	55.71250	523.5	59.33750
407.5	44.83750	436.5	48.46250	465.5	52.08750	495	55.77500	524	59.40000
408	44.90000	437	48.52500	466	52.15000	495.5	55.83750	524.5	59.46250
408.5	44.96250	437.5	48.58750	466.5	52.21250	496	55.90000	525	59.52500
409	45.02500	438	48.65000	467	52.27500	496.5	55.96250	525.5	59.58750
409.5	45.08750	438.5	48.71250	467.5	52.33750	497	56.02500	526	59.65000
410	45.15000	439	48.77500	468	52.40000	497.5	56.08750	526.5	59.71250
410.5	45.21250	439.5	48.83750	468.5	52.46250	498	56.15000	527	59.77500
411	45.27500	440	48.90000	469	52.52500	498.5	56.21250	527.5	59.83750
411.5	45.33750	440.5	48.96250	469.5	52.58750	499	56.27500	528	59.90000
412	45.40000	441	49.02500	470	52.65000	499.5	56.33750	528.5	59.96250
412.5	45.46250	441.5	49.08750	470.5	52.71250	500	56.40000	529	60.02500
413	45.52500	442	49.15000	471	52.77500	500.5	56.46250	529.5	60.08750
413.5	45.58750	442.5	49.21250	471.5	52.83750	501	56.52500	530	60.15000
414	45.65000	443	49.27500	472	52.90000	501.5	56.58750	530.5	60.21250
414.5	45.71250	443.5	49.33750	472.5	52.96250	502	56.65000	531	60.27500
415	45.77500	444	49.40000	473	53.02500	502.5	56.71250	531.5	60.33750
415.5	45.83750	444.5	49.46250	473.5	53.08750	503	56.77500	532	60.40000
416	45.90000	445	49.52500	474	53.15000	503.5	56.83750	532.5	60.46250
416.5	45.96250	445.5	49.58750	474.5	53.21250	504	56.90000	533	60.52500
417	46.02500	446	49.65000	475	53.27500	504.5	56.96250	533.5	60.58750
417.5	46.08750	446.5	49.71250	475.5	53.33750	505	57.02500	534	60.65000
418	46.15000	447	49.77500	476	53.40000	505.5	57.08750	534.5	60.71250
418.5	46.21250	447.5	49.83750	476.5	53.46250	506	57.15000	535	60.77500
419	46.27500	448	49.90000	477	53.52500	506.5	57.21250	535.5	60.83750
419.5	46.33750	448.5	49.96250	477.5	53.58750	507	57.27500	536	60.90000
420	46.40000	449	50.02500	478	53.65000	507.5	57.33750	536.5	60.96250
420.5	46.46250	449.5	50.08750	478.5	53.71250	508	57.40000	537	61.02500
421	46.52500	450	50.15000	479	53.77500	508.5	57.46250	537.5	61.08750
421.5	46.58750	450.5	50.21250	479.5	53.83750	509	57.52500	538	61.15000
422	46.65000	451	50.27500	480	53.90000	509.5	57.58750	538.5	61.21250
422.5	46.71250	451.5	50.33750	480.5	53.96250	510	57.65000	539	61.27500
423	46.77500	452	50.40000	481	54.02500	510.5	57.71250	539.5	61.33750
423.5	46.83750	452.5	50.46250	481.5	54.08750	511	57.77500	540	61.40000
424	46.90000	453	50.52500	482	54.15000	511.5	57.83750	540.5	61.46250
424.5	46.96250	453.5	50.58750	482.5	54.21250	512	57.90000	541	61.52500
425	47.02500	454	50.65000	483	54.27500	512.5	57.96250	541.5	61.58750
425.5	47.08750	454.5	50.71250	483.5	54.33750	513	58.02500	542	61.65000
426	47.15000	455	50.77500	484	54.40000	513.5	58.08750	542.5	61.71250
426.5	47.21250	455.5	50.83750	484.5	54.46250	514	58.15000	543	61.77500
427	47.27500	456	50.90000	485	54.52500	514.5	58.21250	543.1	61.83750
427.5	47.33750	456.5	50.96250	485.5	54.58750	515	58.27500	544	61.90000
428	47.40000	457	51.02500	486	54.65000	515.5	58.33750	544.5	61.96250
428.5	47.46250	457.5	51.08750	486.5	54.71250	516	58.40000	545	62.02500
429	47.52500	458	51.15000	487	54.77500	516.5	58.46250	545.5	62.08750
429.5	47.58750	458.5	51.21250	487.5	54.83750	517	58.52500	546	62.15000
530	47.65000	459	51.27500	488	54.90000	517.5	58.58750	546.5	62.21250
530.5	47.71250	459.5	51.33750	488.5	54.96250	518	58.65000	547	62.27500
431	47.77500	460	51.40000	489	55.02500	518.5	58.71250	547.5	62.33750
431.5	47.83750	460.5	51.56250	489.5	55.08750	519	58.77500	548	62.40000
432	47.90000	461	51.52500	490	55.15000	519.5	58.83750	548.5	62.46250
432.5	47.96250	461.5	51.58750	490.5	55.21250	520	58.90000	549	62.52500
433	48.02500	462	51.65000	491	55.27500	520.5	58.96250	549.5	62.58750
433.5	48.08750	462.5	51.71250	491.5	55.33750	521	59.02500	550	62.65000
434	48.15000	463	51.77500	492	55.40000	521.5	59.08750		
434.5	48.21250	463.5	51.83750	492.5	55.46250	522	59.15000		

b. Adjust CALIBRATOR ZERO ADJ control to fully CCW position.

c. While holding CALIBRATOR switch in ON position, adjust CALIBRATOR ZERO ADJ control until a peak indication is observed on CARRIER LEVEL AND TUNE UP meter; continue turning until a null and a second peak is observed. The correct setting of this control is at the null between two peaks.

Intermediate Stage Tune-Up

a. Adjust XTAL OSC., MIXER, RF AMPL, DRIVER and FINAL to approximate desired frequency as indicated on front panel.

b. Connect 50-ohm load to RF OUTPUT connector J3.

c. Adjust CARRIER ADJUST and ATTENUATOR controls to maximum CW position.

d. Simultaneously depress PUSH TO TUNE pushbutton, located directly under XTAL OSC. control, and tune XTAL OSC. control for maximum indication on CARRIER LEVEL AND TUNE UP meter.

e. Release switch and repeat same procedure for MIXER, RF AMPL, and DRIVER stages using PUSH TO TUNE pushbutton located directly under respective controls.

f. Tune FINAL control for peak indication on CARRIER LEVEL AND TUNE UP meter. No PUSH TO TUNE pushbutton is required for this adjustment.

NOTE

It may be necessary to readjust the ATTENUATOR and CARRIER ADJUST controls to keep CARRIER LEVEL AND TUNE UP meter reading on scale.

g. Without depressing any of the pushbuttons, repeak the RF AMPL, DRIVER, and FINAL controls.

h. Adjust CARRIER ADJUST control until 100k uv or red line is indicated on the CARRIER LEVEL AND TUNE UP meter. If unable to reach red line with CARRIER ADJUST control turn ATTENUATOR control clockwise to increase reading or CCW to reduce reading.

i. Adjust the fiducial ring of the ATTENUATOR dial until its index mark is aligned with the ATTENUATOR dial reading of 100k (100,000 uv). The output level of the BSG-17R can now be adjusted by means of the ATTENUATOR dial. Rotate this dial until the desired output level (in microvolts) is exactly aligned with the fiducial ring index mark.

Deviation Calibration Check

a. Connect an audio oscillator to audio input connector J2 or J5 and adjust for output of 15,500 cps at 1.5 volts rms.

b. Set DEVIATION RANGE switch to 300 position, and adjust DEVIATION ADJUST to minimum.

NOTE

The following adjustments must be made with CALIBRATOR switch in the ON position.

c. Adjust CALIBRATOR ZERO ADJ control for a maximum indication on CARRIER LEVEL AND TUNE UP meter.

d. Advance DEVIATION ADJUST control until a null is observed on meter. The deviation meter should indicate 300 kc ±10%.

e. Set DEVIATION RANGE switch to 150 range, and change audio oscillator frequency to 7500 cps.

f. Set DEVIATION ADJUST control to minimum, then advance until a null is observed. The deviation meter should indicate 150 kc ±10%.

NOTE

If either of these readings are not within specified limits, internal calibration is necessary before performing any tests.

g. Upon completion of deviation calibration check, set DEVIATION ADJUST control fully CCW. Repeat Calibrator Adjustment procedure.

Deviation Adjust

a. Connect an audio signal to AUDIO INPUT connector J2 or J5.

b. Adjust input audio level for 1.5 volts rms and select any frequency from 300 to 80,000 cps.

c. Switch DEVIATION RANGE switch to proper range, and set DEVIATION ADJUST control to desired amount of deviation as indicated on deviation meter.

2-4 OPERATION Disconnect 50-ohm load from RF OUTPUT connector J3 and replace with r-f cable provided. Connect opposite end of cable to receiver under test. Adjust ATTENUATOR to desired r-f level. The input to the receiver is now indicated by the attenuator dial. The deviation is indicated by the deviation meter.

SECTION III
THEORY OF OPERATION

The schematic diagram, figures 17 and 18, shows that the BSG-17R circuit components are either part of subassembly modules (designated A1, A2, A3, etc) or part of the BSG-17R main chassis. (Any components not enclosed by a dotted line are part of main chassis.) Subassemblies discussed below are referenced by subassembly number. Where additional functional circuits (within subassemblies) are described, the subassembly that the circuit is a part of is referenced. Refer to section IV for location of subassemblies. Proceed with discussion below, using the block diagram (figure 3) and schematic diagram (figures 17 and 18) as guides.

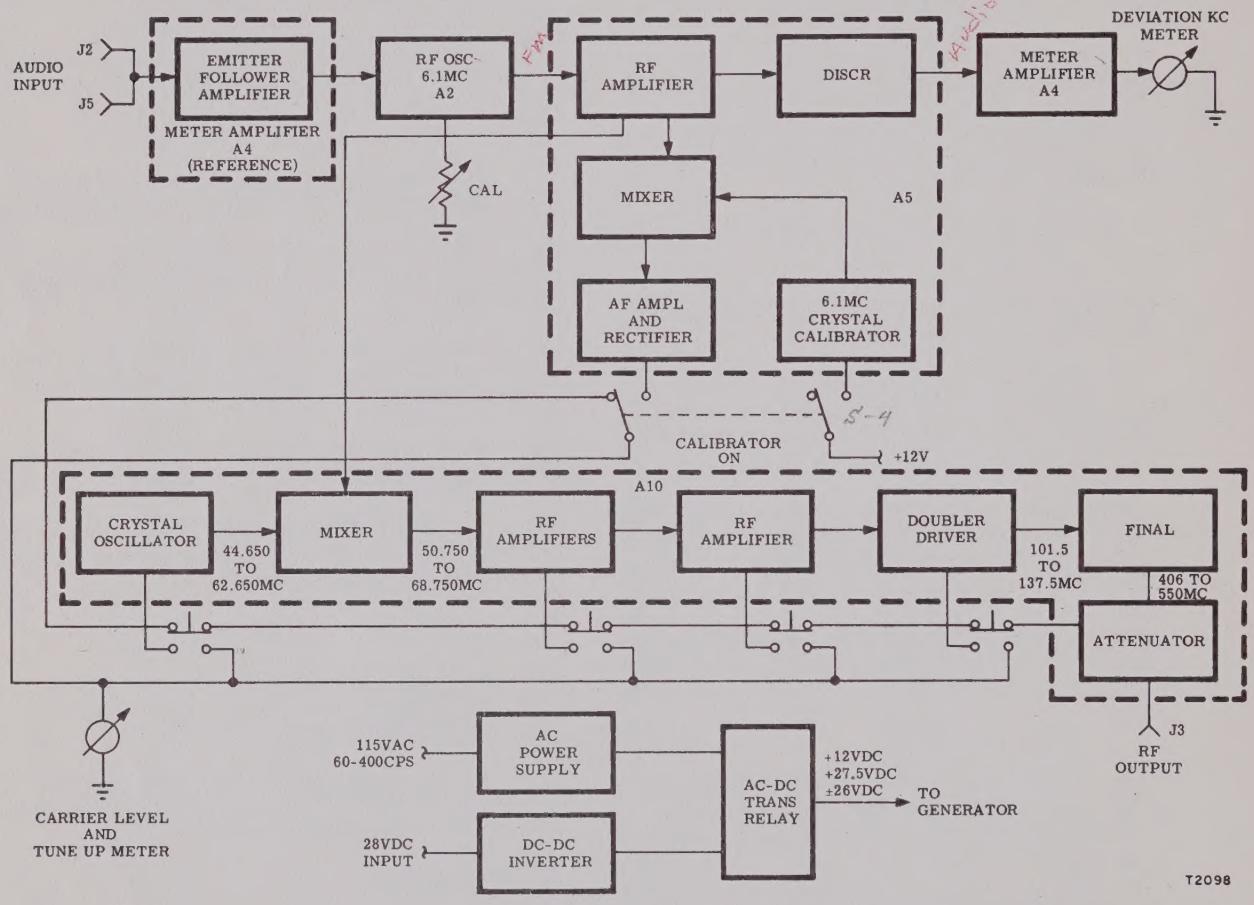


Figure 3. Block Diagram.

3-1 R-F OSCILLATOR (A2) The input audio signal from J2 or J5 is applied through an Emitter Follower Amplifier stage (Q4 on A4 subassembly) to the R. F. Oscillator-6.1 mc subassembly (A2). Transistor Q1 (2N706) functions as a master oscillator and produces an r-f signal at 6.1 megacycles. The operating frequency is controlled by trimmer capacitor C2. Fine-tuning adjustment is obtained by the CALIBRATION adjust control R5 located on the front panel. Potentiometer R2, which is an internal adjustment located on subassembly A3 enables the operating frequency to be adjusted in order to center the CALIBRATION adjust control R5. The CALIBRATION adjust R5 and potentiometer R2 control the bias voltage applied to capacitive diode CR-1. Capacitive diode CR-1 frequency modulates the master oscillator by the application of the input audio signal.

3-2 DISCRIMINATOR OSCILLATOR AMPLIFIER (A5) The 6.1-megacycle signal from the R-f Oscillator-6.1 (A2) is applied to the Discriminator Oscillator Amplifier (A5) by means of a coaxial cable. The 6.1-megacycle signal is amplified by transistor Q1 and is available at output connector J4 to be used by the R-f Amplifier subassembly (A10). The 6.1-megacycle signal is further amplified by transistor Q2 and applied to a discriminator consisting of T1, CR-1, and CR-2 and associated circuitry.

The recovered audio from the Discriminator stage is available from connector J1 and is applied to the Meter Amplifier subassembly (A4). The 6.1-megacycle signal from transistor Q1 is also connected to a mixer diode (CR-3) of the Calibrator stage where the signal mixes with a crystal controlled signal of 6.1-megacycles from the crystal oscillator Q3 and associated circuitry. The difference frequency is amplified by transistor Q4 and rectified by diode CR-4. The d-c voltage is available through a switching arrangement for a visual indication on the CARRIER LEVEL AND TUNE UP meter M2.

It should be noted that the calibrator is only available when the CALIBRATOR switch S4 is closed. Switch S4 applies a voltage to the Calibrator stage as well as switching meter M2 (CARRIER LEVEL AND TUNE UP) for use as a visual indicator.

The Calibrator stage of the BSG-17R is not only used to set the R-f Oscillator to 6.1 megacycles, but may be used to check the deviation circuitry. The principle used to check the deviation is the disappearance method: for a particular audio frequency and deviation, the carrier will disappear. This procedure is outlined in section II, Deviation Calibration Check.

3-3 R-F AMPLIFIER (A10) The r-f signal from the Discriminator Oscillator Amplifier subassembly (A5) is connected to the R-f Amplifier subassembly (A10) by means of a coaxial cable. The R-f Amplifier subassembly (A10) mixes the 6.1-megacycle signal with an r-f signal from the crystal oscillator consisting of Q1 and associated circuitry. The crystal oscillator operates from 44.650 to 62.650 megacycles, depending on the frequency of the crystal installed. The sum-frequency is selected from the mixer CR-2 and is amplified by transistorized r-f stages Q2, Q3, Q4, Q5, and Q6. Transistor-stage Q7 is a frequency doubler driver, tunable from 101.5 to 137.5 megacycles. The output of the Doubler Driver stage is coupled to a capacitive-diode stage consisting of CR-6. In this stage the r-f signal is multiplied by a factor of four; resulting in the desired output frequency range of the BSG-17R. A piston attenuator is coupled to the output-tuned circuit and provides a means of adjusting the output signal from 1 to 100,000 microvolts.

3-4 METER AMPLIFIER (A4) The recovered audio signal from the Discriminator stage of the Discriminator Oscillator Amplifier subassembly A5 is connected to a high-gain transistorized amplifier consisting of transistors Q1, Q2, and Q3. The audio signal is rectified by diodes CR-1 and CR-2 and is applied to the DEVIATION KC meter M1. This subassembly contains adjustments for adjusting the deviation level for the three deviation ranges and frequency response.

3-5 POWER SUPPLY SECTION (MAIN CHASSIS) The power supply section can be divided into two sections for discussion: the a-c section and the d-c section. When the BSG-17R is operated from a d-c source of 27 volts ±10%, relay K1 operates and transfers the required circuitry to the output of the DC-DC Inverter. The output of this DC-DC Inverter is regulated at 27 volts dc. The crystal oscillator ovens and master oscillator oven operate on the d-c input and are not regulated.

The a-c power supply section of the BSG-17R consists of a full-wave bridge rectifier and a 27-volt 50 watt zener diode. With this mode of operation, relay K1 is de-energized and the required circuitry is connected to the 27-volt zener diode.

The voltage required to operate the ovens of the Crystal Oscillator stages of A5 and A10, the R-f Oscillator subassembly (A2), and spare crystal oven is obtained by another full-wave bridge rectifier and transistorized regulator circuit. Operation of the oven heaters on dc is desired to eliminate any 60-cycle hum problems.

SECTION IV

MAINTENANCE

The BSG-17R should provide continuing maintenance-free operation. If a malfunction should occur, as evidenced during performance of preliminary operation procedures, normal operation, or during the performance of alignment procedures, the information contained in this section will allow the unit to be rapidly restored to normal operation.

Included in this section are alignment procedures; a voltage and resistance chart; and a disassembly-assembly procedure. The location of major subassemblies and adjustments are shown in figure 4. Test point voltage and resistance information is given in table III. For location and listing of detailed replaceable electronic components, refer to section V.

As can be seen in the schematic diagram (figures 17 and 18) and in the parts list section (section V), the BSG-17R circuit components are either housed in (or part of) subassemblies (modules) or mounted directly on the BSG-17R main chassis. Circuits were discussed in section III by function; in this section, reference will be made to circuits as related to the subassembly that they are located on (or part of). All subassemblies will be referred to by the subassembly number (A1, A2, A3, etc).

4-1 ALIGNMENT The BSG-17R was completely adjusted before leaving the manufacturer. No further adjustments should be required. Alignment procedures are included for use only when applicable assemblies or components have been repaired or replaced.

Alignment procedures are included for the R-f Oscillator 6.1 mc (A2), the Discriminator Oscillator-Amplifier (A5), the Meter Amplifier Component Assembly Board (A4), the R-f Amplifier (A10), and the CARRIER LEVEL AND TUNE UP meter circuit.

To gain access to internal assemblies and adjustments (as seen in figure 4), remove BSG-17R top and bottom covers. All adjustments and controls referred to in the procedures that follow are internally located except those appearing in all-upper-case letters; these are located on the front panel.

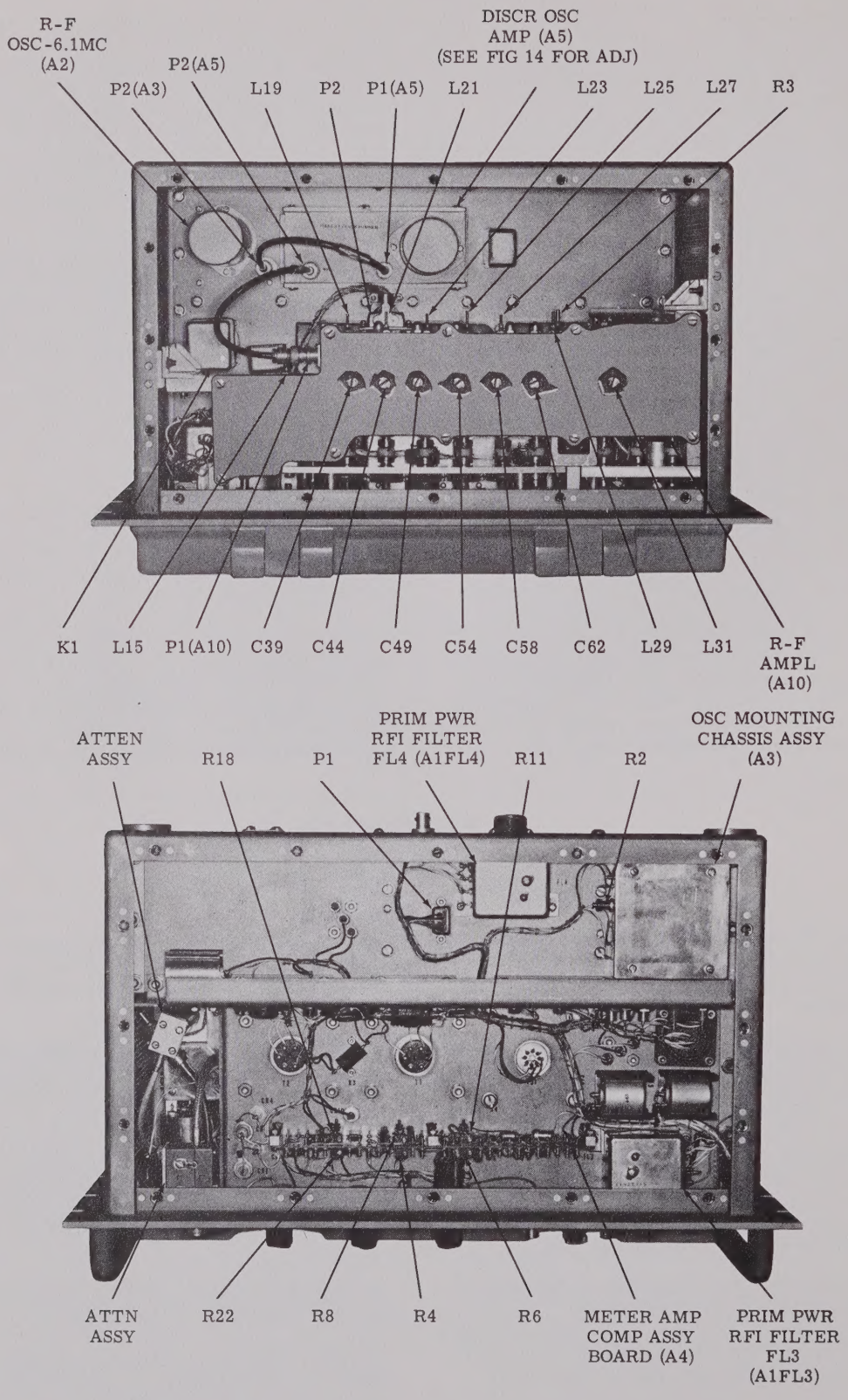


Figure 4 Assembly and Adjustments Location

R-f Oscillator 6.1 mc (A2) Allow BSG-17R 30-minute warm-up period. Connect Frequency Counter (HP 524B) to J1 of module A3. Set CALIBRATOR ZERO ADJ control to center of travel (approximately). Adjust R2 (located on module A3) until frequency counter reads 6.1 mc ±150 cps. Disconnect frequency counter and reconnect P2(A3) to J1(A3).

Discriminator, Oscillator-Amplifier (A5) This procedure contains adjustment information for the r-f amplifier (Q1-Q2 stages), the 6.1-mc calibrator (Q3 stage), and the discriminator (T1). Adjustments are to be made with module (A5) connected to and operating as a part of complete BSG-17R. However, it will be necessary to remove module (A5) in order to gain access to adjustment points. To gain access to adjustments (shown in figure 14), remove four screws securing module to main chassis (accessible from bottom side of main chassis). Remove the module from the BSG-17R and connect adapter cable (refer to figure 5 for cable fabrication) between the module connector and corresponding connector on the main chassis. Module A5 can now be extended away from the main chassis. Remove side plates on module A5, thus exposing adjustment points. The equipment required is: Sweep Generator (Telonic HD-4), VTVM (HP 410B), Frequency Counter (HP 524B) and an Oscilloscope Tektronic Type 535 (Type H Plug-in Head). Apply power and allow a 20-minute warm-up period.

R-f Amplifier (Q1-Q2 Stage)

a. Connect oscilloscope vertical input lead to collector of second stage (Q2).

b. Adjust L1 for peak indication on oscilloscope.

c. Connect, in turn, oscilloscope to points listed below and check for corresponding peak-to-peak voltages.

Input (J3)	0.02
Collector first stage (Q1)	1.8
Base second stage (Q2)	0.5
Collector second stage	4-7.0

d. Connect, in turn, VTVM (HP 410B) to points listed below and check for corresponding d-c voltages. (Tolerance ±10%)

Emitter first stage (Q1)	1.4
Base first stage (Q1)	2.2
Collector first stage (Q1)	10.0
Emitter second stage (Q2)	1.6
Base second stage (Q2)	8.0

6.1-Mc Calibrator (Q3 Stage)

a. Disconnect output cable (P2) and connect frequency counter to output connector (J4).

b. Rotate CALIBRATOR ZERO ADJ control to center point of travel.

c. Disconnect input cable (P1) at connector J3.

d. Place CALIBRATOR switch to ON position.

e. Adjust C3 until frequency counter indicates 6.1 mc ±10 cps.

Discriminator (T1 Stage)

a. Connect equipment as shown in figure 5.

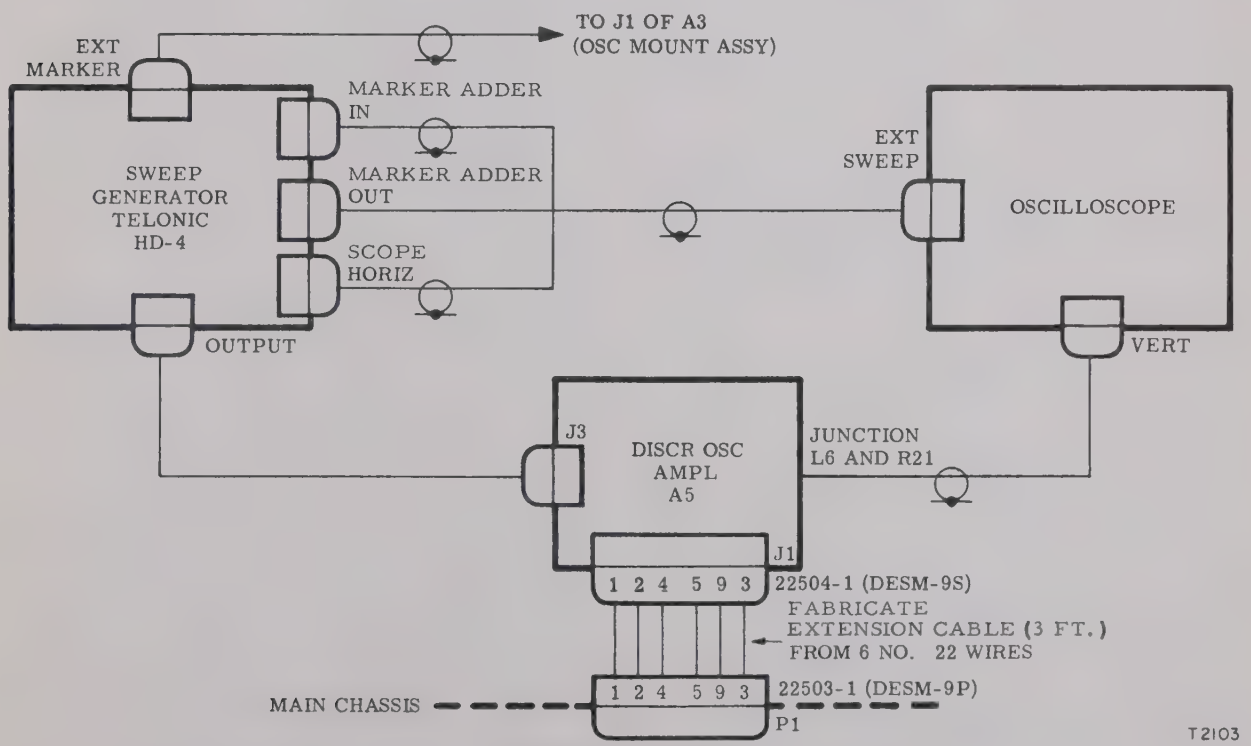


Figure 5 Test Setup

b. Set DEVIATION RANGE switch to 300 position.

c. Adjust bottom of T1 (side with solder terminals, see figure 14) until a "S" curve is obtained on oscilloscope CRT display. Peak top of T1 so that marker displayed on CRT crosses the center of reference line.

d. Repeat step c. above several times until best possible "S" curve is obtained. "S" curve should approximate curve shown in figure 6 .

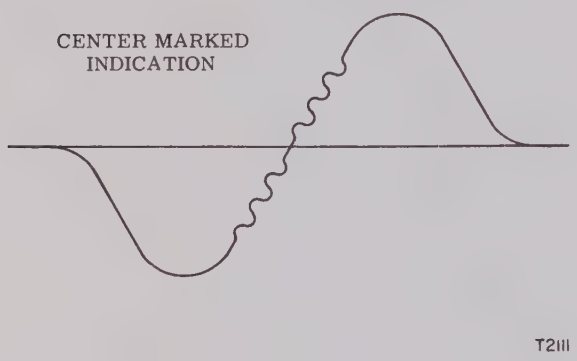


Figure 6. Typical "S" Curve.

R-f Amplifier (A10) This procedure contains tracking adjustment information for the crystal oscillator, (Q1 stage), mixer (Q2, Q3, Q4, and Q5 stages), r-f amplifier (Q6 stage), driver (Q7 stage), and final (L32 and L33 stages). It will only be necessary to remove the top shielding cover from the R-f Amplifier assembly (see figure 4) in order to gain access to internal adjustments. A Spectrum Analyzer UPM-84 will be required for this procedure. Apply power and allow for 20-minute warm-up period.

NOTE

To align the BSG-17R for proper tracking, it will be necessary to check unit at 406 mc and 550 mc. To facilitate this procedure, insert the correct crystal for 406 and 550-mc operation in the same crystal container and insert container in XTAL OVEN.

Crystal Oscillator (Q1 Stage)

a. Place XTAL switch to position (1 or 2) corresponding to 406-mc crystal position in crystal oven.

b. Set XTAL OSC control to 406 mark.

c. While depressing XTAL OSC. pushbutton, adjust L15 for maximum indication on CARRIER LEVEL AND TUNE UP meter.

d. Place XTAL switch to position corresponding to 550-mc crystal position in crystal oven.

e. Repeat step c. above. If setting of L15 needs to be changed from previous setting (for 406 mc operation), it will be necessary to obtain an approximate dial setting (for 406 and 550) for one adjustment setting of L15.

Mixer Tracking (Q2-Q5 Stages)

NOTE

The following procedure should be attempted only when absolutely necessary.

a. Place XTAL switch to position corresponding to 406-mc crystal position in crystal oven.

b. Rotate MIXER tuning control until tuning capacitors are fully meshed. If for some reason one or more tuning capacitors are not fully meshed, loosen their respective set screws on the R-f Amplifier side of the nylon coupler located between the R-f Amplifier assembly and gear train; mesh tuning capacitors and re-tighten set screws.

c. Back tuning slugs of inductors L19, L21, L23, L25, and L27 all the way out; then turn CW (slug in) four turns.

d. Set trimmer capacitors C39, C44, C49, C54, and C58 to approximately 1/2-meshed position.

e. Tune spectrum analyzer to 50.75 mc. Lightly couple spectrum analyzer to coil L21 of the succeeding stage with a small coupling loop and tune MIXER control knob for maximum indication on spectrum analyzer. Pointer on MIXER control should be indicating 406 on panel. If pointer is sufficiently off to warrant readjustment proceed as follows: Slowly rotate MIXER control knob so that pointer points in desired direction and readjust slug of inductor L19 for maximum response on spectrum analyzer. Continue this process until MIXER pointer aligns with the 406 marking. Visually observe the MIXER tuning capacitors. They should be rotated approximately 30 degrees from their fully meshed position.

f. Lightly couple spectrum analyzer to coil L23 of the succeeding stage and adjust L21 for maximum indication on spectrum analyzer.

g. Lightly couple spectrum analyzer to coil L25 of the succeeding stage and adjust L23 for maximum indication on spectrum analyzer.

h. Lightly couple spectrum analyzer to coil L27 of the succeeding stage and adjust L25 for maximum indication on spectrum analyzer.

i. While depressing MIXER pushbutton, adjust L27 for maximum indication on CARRIER LEVEL AND TUNE UP meter. If meter reads off scale, decouple meter pickup loop on L27 (pickup loop connected to diode) until meter reads approximately 2/3 scale. Retrim L19, L21, L23, L25, and L27 for maximum reading of CARRIER LEVEL AND TUNE UP meter while depressing MIXER pushbutton

j. Place XTAL switch to position corresponding to 550-mc crystal position in crystal oven.

k. Tune XTAL OSC. to 550 mc mark and tune for maximum indication on CARRIER LEVEL AND TUNE UP meter while depressing XTAL OSC. pushbutton.

l. Set MIXER control pointer to 550 mark.

NOTE

If no indication is evident on CARRIER LEVEL AND TUNE UP meter at 550 mc, it will be necessary to lightly couple the spectrum analyzer into the circuits as outlined in steps e through i substituting the trimmer capacitors C39 for L19, C44 for L21, C49 for L23, C54 for L25, C58 for L27 to complete the alignment at 550 mc. Spectrum analyzer must be tuned to 68.750 mc.

R-f Amplifier (Q6 Stage)

a. Place XTAL switch to position corresponding to 406-mc crystal position in crystal oven.

b. Tune XTAL OSC. and MIXER controls to 406 mc and tune for maximum indication on CARRIER LEVEL AND TUNE UP meter using the respective pushbuttons.

c. Set RF AMPL control to 406 mark.

d. While depressing RF AMPL pushbutton, adjust L29 for maximum indication on CARRIER LEVEL AND TUNE UP meter. It may be necessary to decouple meter pickup loop further if meter reads off scale.

e. Place XTAL switch to position corresponding to 550-mc crystal position in crystal oven.

f. Tune XTAL OSC. and MIXER controls to 550 mc and tune for maximum indication on CARRIER LEVEL AND TUNE UP meter using the respective pushbuttons.

g. Set RF AMPL control to 550 mark.

h. While depressing RF AMPL pushbutton, adjust C62 for maximum indication on CARRIER LEVEL AND TUNE UP meter. It may be necessary to readjust LC ratio in order to obtain optimum tracking for both 406-mc and 550-mc RF AMPL dial settings.

Driver (Q7 Stage)

a. Place XTAL switch to position corresponding to 406-mc crystal position in crystal oven.

b. Tune XTAL OSC., MIXER, and RF AMPL knobs to 406 mc and tune each for maximum indication on CARRIER LEVEL AND TUNE UP meter using the respective pushbuttons.

c. Set DRIVER control to 406 mark.

d. While depressing DRIVER pushbutton, adjust L31 for maximum indication on CARRIER LEVEL AND TUNE UP meter.

e. Place XTAL switch to position corresponding to 550-mc crystal position in crystal oven.

f. Tune XTAL OSC., MIXER, and RF AMPL knobs to 550 mc and tune each for maximum indication on CARRIER LEVEL AND TUNE UP meter using respective pushbuttons.

g. Repeat step d. above. If setting of L31 needs to be changed from previous setting (for 406-mc operation), it will be necessary to obtain approximate dial settings for one adjustment setting of L31.

Final (L32, L33 Stage)

a. Place XTAL switch to position corresponding to 406-mc crystal position in crystal oven.

b. Tune XTAL OSC., MIXER, RF AMPL, and DRIVER to 406 mc and tune each for maximum indication on CARRIER LEVEL AND TUNE UP meter using respective pushbuttons.

c. Set FINAL control to 406 mark.

NOTE

The following steps, d.through i.should be attempted only when absolutely necessary.

d. Using an Allen head wrench, loosen set screws securing capacitors C68 and C69 to FINAL tuning control gear train. (Set screws on R-f Amplifier side of nylon linkage.) Set both capacitors to approximately fully meshed position (maximum capacitance).

e. Tune spectrum analyzer to 406 mc. Lightly couple spectrum analyzer to the parallel wires in last stage by using a coupling loop.

f. Adjust in turn capacitors C68 and C69 (do not move gear train) for maximum indication on spectrum analyzer. Tighten set screws.

g. Bend parallel wires in final stage until no further increase is indicated on spectrum analyzer when using a brass or iron slug in close proximity to both stages.

h. Place XTAL switch to position corresponding to 550-mc crystal position in crystal oven.

i. Set FINAL control to 550 mark.

j. Tune XTAL OSC., MIXER, RF AMPL, and DRIVER to 550 mc and tune each for maximum indication on CARRIER LEVEL AND TUNE UP meter using the respective pushbuttons.

k. Recheck tuning of both stages in order to obtain optimum tracking for both 406-mc and 550-mc FINAL dial settings.

CARRIER LEVEL AND TUNE UP Meter This procedure is performed in order to calibrate the CARRIER LEVEL AND TUNE UP meter for 100.000

microvolts. A Bolometer (HP 430C) with an input impedance of 51 ohms is required. This procedure should only be performed after R-f Amplifier has been aligned. Apply power and allow for 20-minute warm-up period.

a. Connect bolometer to RF OUTPUT connector J3.

b. Rotate ATTENUATOR control fully CW, then back off four or five divisions.

c. Rotate fiducial ring on ATTENUATOR control until mark is opposite 100K callout division on ATTENUATOR control.

d. Adjust CARRIER ADJUST control for 100,000 uv indication on bolometer.

e. Adjust R3 until CARRIER LEVEL AND TUNE UP meter needle is aligned with SET 100K UV red line.

Meter Amplifier Component Assembly Board (A4)
This procedure contains information for adjusting the deviation level and frequency compensation circuitry. All adjustments (except front panel adjustments) are located on Meter Amplifier Component Assembly Board (A4) as shown in figure 4. Spectrum analyzer deviation determination information is shown in figure 7. Equipment required for this test are: Audio Frequency Oscillator (HP 200C), VTVM (HP 400D), and a Spectrum Analyzer (AN/UPM-84). Apply power and allow for 20-minute warm-up period.

a. Hold CALIBRATOR switch to ON position and adjust CALIBRATOR ZERO ADJ for null indication on CARRIER LEVEL AND TUNE UP meter.

b. Place DEVIATION RANGE switch to 50 position.

c. Connect a-f oscillator to AUDIO INPUT connector J2 (front panel) or J5 (back panel). Adjust oscillator for 20.792 kc signal and amplitude of 1.5 volts rms.

d. Connect spectrum analyzer to RF OUTPUT connector. Tune spectrum analyzer to BSG-17R r-f operating frequency.

e. Starting from fully CCW position, rotate DEVIATION ADJUST control clockwise until one disappearance is observed on spectrum analyzer. Do not move DEVIATION ADJUST control from this setting for remainder of audio alignment.

f. Adjust R11 until DEVIATION KC meter reads 50 kc (red number).

g. Adjust a-f oscillator for 80 kc and 1.5 volts rms output.

h Adjust R6 until DEVIATION KC meter reads 50 (red number).

i. Vary a-f oscillator between 300 cps and 80 kc. DEVIATION KC meter should read 50 kc ±10% (red number) within this frequency spectrum.

j. Place DEVIATION RANGE switch to 150 position.

k. Readjust a-f oscillator for 27.174kc and 1.5 volt rms output. At this time, two carrier disappearances should be observed on spectrum analyzer. If two carrier disappearances are not observed, adjust R18 until two carrier disappearances are observed.

l. Adjust R4 until DEVIATION KC meter reads 150 kc (red number).

m. Place DEVIATION RANGE switch to 300 position.

n. Adjust a-f oscillator for 25.441 kc and 1.5 volts rms output. At this time, four carrier disappearances should be observed on spectrum analyzer. If four carrier disappearances are not observed, adjust R22 until four carrier disappearance are observed.

o. Adjust R8 until DEVIATION KC meter reads 300 kc (red number).

4-2 DISASSEMBLY-REASSEMBLY Included in this paragraph is a brief description of how to remove and install the R-f Amplifier Assembly (A10). Removal of other assemblies is relatively simply and can be accomplished by inspection.

To remove the R-f Amplifier Assembly (A10) from the BSG-17R main chassis it is necessary to remove items listed below in order presented.

a. Two screws on either side of BSG-17R main chassis securing rear mounting brackets.

b. Locate three Phillips head screws in a vertical line on left side of XTAL switch. Remove only top and bottom screws, and not the middle screw.

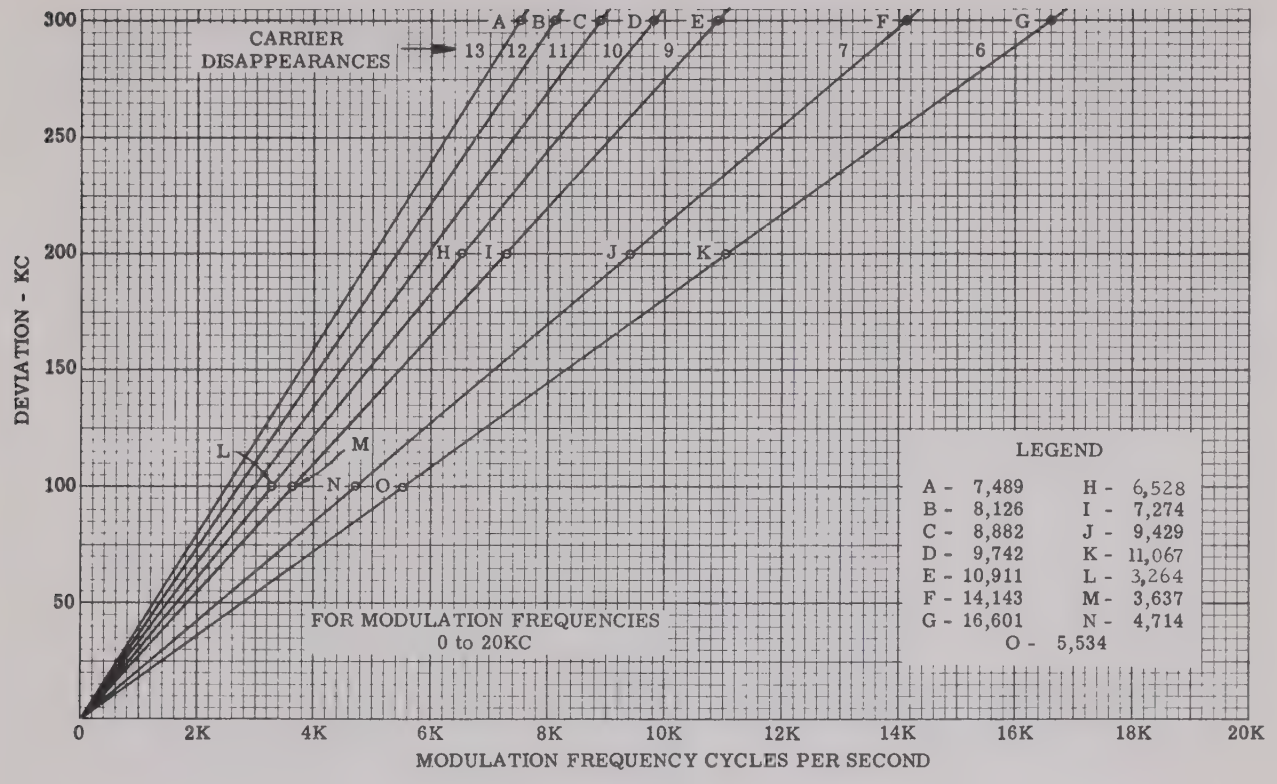
c. Locate three Phillips head screws in vertical line on right side of RF AMPL control. Remove only top and bottom screws, and not the middle screw.

d. Single screws on both sides of MIXER control knob.

e. MIXER control and pointer.

f. If main chassis covers (top and bottom) are not removed, remove now.

g. RF OUTPUT attenuator block (four screws).



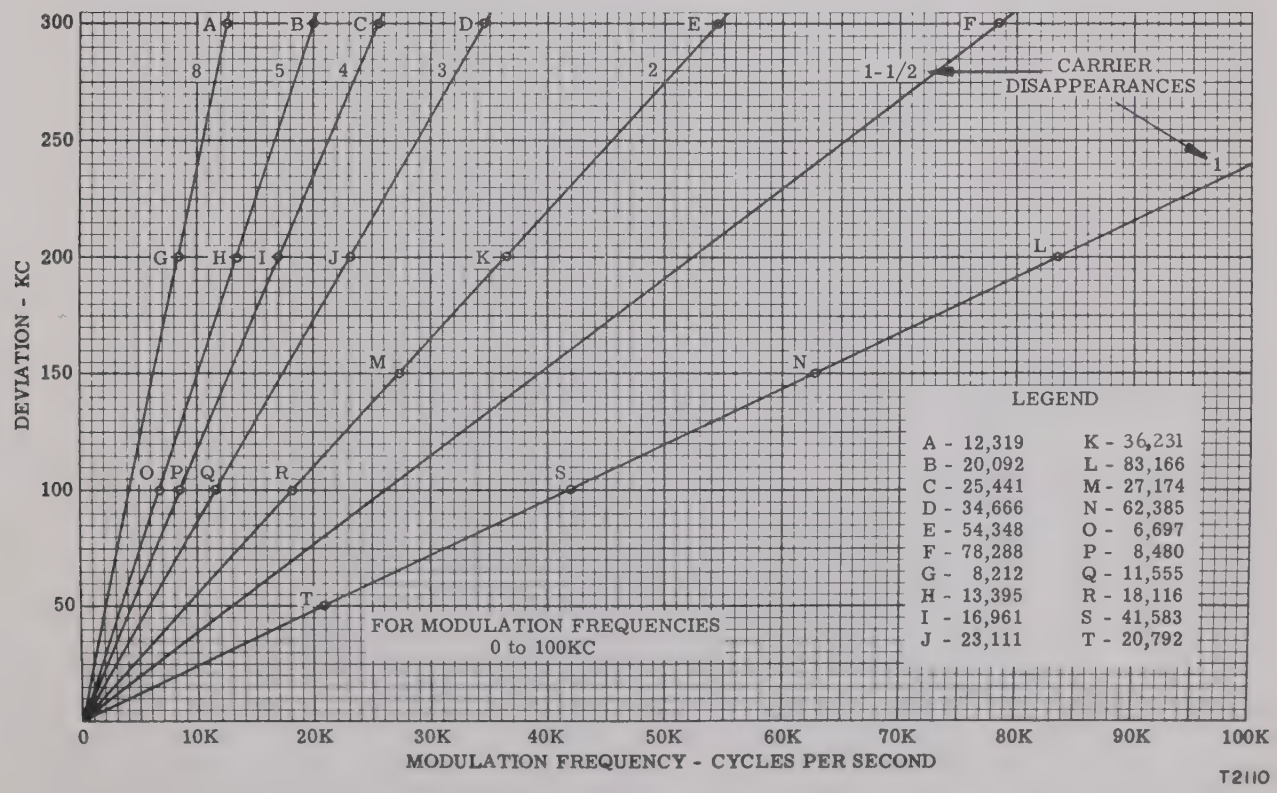


Figure 7. Deviation Chart.

h. Wire connected to R32 on RF OUTPUT attenuator block.

i. Loosen set screws on attenuator flexible coupling shaft at attenuator end.

j. Remove XTAL oven.

The assembly can now be moved back about 1 inch and then lifted up and out. Be careful that attenuator block is guided out without catching on the edge of the chassis. Make sure that nylon couplers remain on front panel shafts.

To install the R-f Amplifier Assembly, perform foregoing procedure in reverse, insuring that the following precautions are also followed.

a. Insure that tuning shafts are in correct position before engaging with nylon bushings.

b. Insure that attenuator flexible coupling shaft is engaged before engaging with locating pins on front panel.

c. Set ATTENUATOR control to approximately 100K position before tightening set screws securing RF OUTPUT attenuator block.

TABLE III VOLTAGE AND RESISTANCE CHART

Voltages:

Controllable power source connected to either POWER INPUT J1 (front) or J4 (back). Power switches to positions as indicated. Voltage measurements made with VTVM (HP 410B).

Switch Position	Test Point	Voltage
(1) POWER/OFF switch to POWER	P2, pin 15 and P1, pin 3	-26 vdc with 115 vac power +26 vdc with 27 vdc power
	Pin 3 to 7 on SPARE oven socket	-26 vdc with 115 vac power +26 vdc with 27 vdc power
(2) CARRIER/OFF switch to CARRIER	P2, pin 7	+27 vdc
	P1, pin 2	+12 vdc

NOTE

Vary both input voltages between maximum tolerance limits (103 to 126 vac, 25 to 29 vdc). Voltages listed in step (2) should remain constant.

Resistances:

Power disconnected. Measurements are made under normal operating conditions if no specific condition is noted. Measurements made with VTVM (HP 410B).

Assembly or Component	Conditions	Test Point	Resistance
Discriminator Oscillator-Amplifier (A5)			
Power connector J1 (A5)	Meter ground lead connected to A5 chassis. P1 disconnected from J1 (A5)	Pin 1	0 ohms
		Pin 2	6,000 ohms 3,000 ohms (with meter leads reversed)
		Pin 3	100 ohms
		Pin 4	8,200 ohms
		Pin 5	10,000 ohms
		Pin 9	INF ohms

TABLE III VOLTAGE AND RESISTANCE CHART (Cont'd)

Assembly or Component	Conditions	Test Point	Resistance
R-f Amplifier (A10)			
Power connector J1 (A10)	Connect meter lead to A10 chassis as listed	Pin 1	INF ohms (-ground) INF ohms (+ground)
		Pin 3	15 Meg ohms (-ground) 5 ohms (+ground)
		Pin 5	2,700 ohms (-ground) 100,000 ohms (+ground)
		Pin 7	1,700 ohms (-ground) 1,700 ohms (+ground)
		Pin 8	0 ohms (-ground) 0 ohms (+ground)
		Pin 9	20 Meg ohms (-ground) 6,900 ohms (+ground)
		Pin 10	INF ohms (-ground) INF ohms (+ground)
R-f Amplifier (A10) (Cont'd)		Pin 11	INF ohms (-ground) 19,000 ohms (+ground)
		Pin 13	2.5 Meg ohms (-ground) 150,000 ohms (+ground)
		Pin 15	INF ohms (-ground) INF ohms (+ground) With XTAL oven removed
6.1 mc input connector J2 (A10)	Meter ground lead connected to A10 chassis		4 ohms
Attenuator output connector RF OUTPUT	Meter ground lead connected to main chassis		51 ohms
BSG-17R Main Chassis			
Power connector J1 (front) and J4 (back)	With POWER/OFF switch to: POWER	Pin A to Pin B	5 ohms
	With CARRIER/OFF switch to CARRIER	Pin A to Pin B	3 ohms
	With F2 removed	Pin A to Pin B	INF ohms
	With both power switches normally open	Pin A to Pin B	INF ohms
	With both power switches on	Pin A to ground	INF ohms
		Pin C to ground	0 ohms
		Pin E to ground	0 ohms
	POWER/OFF switch to POWER	Pin D to Pin E	200 ohms
	CARRIER/OFF switch in CARRIER	Pin D to Pin E	80 ohms
	F1 removed	Pin D to Pin E	INF ohms
	Both power switch and CARRIER switch to OFF	Pin D to Pin E	INF ohms

TABLE III VOLTAGE AND RESISTANCE CHART (Cont'd)

Assembly or Component	Conditions	Test Point	Resistance
BSG-17R Main Chassis (Cont'd)			
Power connector to R-f Amplifier P2 (A10)	R x 10,000 scale (-ground)	Pin 1 to ground	Note deflection on CARRIER LEVEL AND TUNE UP meter
	S4, S5, S6, S7, S8 depressed (in turn)	Pin 1 to ground	INF ohms - CARRIER LEVEL AND TUNE UP meter drops to zero
	R x 10,000 scale (+ground)	Pin 3 to ground	INF ohms
	S8 depressed	Pin 3 to ground	Note CARRIER LEVEL AND TUNE UP meter deflection
	R x 10,000 scale (+ground)	Pin 9 to ground	INF ohms
	S7 depressed	Pin 9 to ground	Note CARRIER LEVEL AND TUNE UP meter deflection
	R x 10,000 scale (+ground)	Pin 11 to ground	INF ohms
	S6 depressed	Pin 11 to ground	Note CARRIER LEVEL AND TUNE UP meter deflection
	R x 10,000 scale (+ground)	Pin 13 to ground	INF ohms
	S5 depressed	Pin 13 to ground	Note CARRIER LEVEL AND TUNE UP meter deflection
	+ground	Pin 15 to ground	40 ohms
	+ground	Pin 10 to ground	75,000 ohms
	-ground +ground	Pin 7 to ground Pin 7 to ground Pin 5 to ground	160 ohms 9 ohms 0 to 175 ohms (Vary CARRIER ADJUST)
		Pin 2, 4, 6, 12, 14 to ground	N. C.
		Pin 8 to ground	0 ohms
Power connector to Discriminator Oscillator-Amplifier (A5), P1 (connect meter lead to chassis as listed) A5 module disconnected		Pin 1 to ground	0 ohms (-ground) 0 ohms (+ground)
		Pin 2 to ground	200 ohms (-ground)* 12 ohms (+ground)
		Pin 3 to ground	20 ohms (-ground)* 35 ohms (+ground)
		Pin 4 to ground	15,000 ohms (-ground)
	S4 depressed	Pin 5 to ground	200 ohms (-ground)* 12 ohms (+ground)
		Pin 6 to ground	N. C.
		Pin 7 to ground	N. C.
		Pin 8 to ground	N. C.
	S4 depressed R x 10,000 scale	Pin 9 to ground	0 ohms (+ground Note CARRIER LEVEL AND TUNE UP meter deflection

*Depends on meter multiplier scale.

SECTION V

PARTS LIST

Main Chassis Group (Figures 8 and 9)

A5P2	MS35168-88E
A5P1	MS35168-88E
A10P1	MS35168-88E
CR1 thru CR8	USN-1N1124A
CR9	USN-1N2822B
CR10	USA-1N2976B
CR11	USA-1N2988B
C1 thru C3	21641-3 (BEC)
C4 thru C7	20739 (BEC)
C8	21641-3 (BEC)
C9 thru C12	20739 (BEC)
C13 thru C16	21641-3 (BEC)
C17 thru C19	CL17CK351TP3
C20	21641-3 (BEC)
C21	20739 (BEC)
C22	20739 (BEC)
C23	21641-3 (BEC)
C24	21641-3 (BEC)
C25	20739 (BEC)
C26	21641-3 (BEC)
C27	20739 (BEC)
C28	21641-3 (BEC)
C29	20739 (BEC)
*DS1	20791 (BEC)
*DS2	20790 (BEC)
FL1	22585 (BEC)
FL2	22585 (BEC)
FL3	113802 (BEC)
FL4	113802 (BEC)
F1 thru F4	F02B125V2AS
J2	MS35183-912A
J5	MS35183-912A
L1	9337-7 (BEC)
L2	9337-7 (BEC)
L3 thru L13	MS16225-2
M1	22466 (BEC)
M2	22470 (BEC)
PS1	22525 (BEC)
P1	22504-1 (BEC)
P2	22504-2 (BEC)
Q1	JAN-2N297-A
R1	MS35045-63
R2	RE70G24R3
R3	RE65G1240
*R4	RV4NAYSD501A
R5	RV6NAYSD252A
*R6	21327-1 (BEC)
*S1	MS35059-22
*S2	MS35059-22
*S3	MS16109N2-3
S4	MS35059-26
K1	20581 (BEC)
S5 thru S8	113973 (BEC)
T1	22239 (BEC)
T2	22239 (BEC)
XA9 (Spare)	113770 (BEC)
XK1	MS3102R22-19S
XF1, XF3	FHL18G2
XF2, XF4	FHL17C

Primary Power Radio Interference Filter, A1FL3, (Figure 10)

C1 thru C3	CB21PE511J
C4 thru C6	20294 (BEC)
C7 thru C10	20739 (BEC)
J1	MS3102R14S-5P
L1 thru L3	112569 (BEC)

Primary Power Radio Interference Filter, A1FL4 (Figure 10)

C1 thru C3	CB21PE511J
C4 thru C6	20294 (BEC)
C7 thru C10	20739 (BEC)
J4	MS3102R14S-5P
L1 thru L3	112569 (BEC)

Rf Oscillator - 6.1 mc, A2 (Figure 11)

CR1	22028 (BEC)
CR2	USN-1N963B
C1	CK60AW102M
C2	22004-1 (BEC)
C3	CK06CW152K
C4	CK06CW152K
C5	CK60BX151K
C6	CK63AW103M
C7	CK60BX151K
C8	CK60AW102M
L1	113909 (BEC)
P1	22509 (BEC)
Q1	JAN-2N706
R1	RC07GF162J
R2	RC07GF821J
R3	RC07GF472J
R4	RC07GF103J
R5	RC07GF242J
R6	RC07GF471J
R7	RC07GF102J

Oscillator Mounting Assembly, A3 (Figure 12)

C1	21641-3 (BEC)
C2	CL49CJ060TN3
C3	21641-3 (BEC)
C4	20739 (BEC)

*Not Illustrated

PARTS LIST (CONT)

Oscillator Mounting Assembly, A3 (Figure 12) (Cont)

C5	20739 (BEC)
J1	MS35183-912A
L1	113845 (BEC)
L2	113845 (BEC)
L3	MS91189-36
R1	MS35043-84
R2	RV6LAYSD103A
XA2	(TS101P01) MS35081

Meter Amplifier Component Assembly Board, A4 (Figure 13)

NOTE

A4 items listed below are for BSG-17R serial numbers 1-12 only. Component part numbers in parenthesis are for serial numbers 13 and above. Components noted by * are added for serial numbers 13 and above.

CR1	JAN-1N276
CR2	JAN-1N276
CR3	USN-1N3026B
C1	CL45CJ050MP3
C2 (Selected from 0-56 uuf)	CM15C------N3
C3	CM20E302JN3
C4	Selected 0-56 uuf
C5 thru C8	CL45CJ050MP3
L1	113845 (BEC)
Q1 thru Q3	(USN-2N718A)* JAN-2N706
Q4	JAN-2N706
*RT1	20278 (BEC)
R1	RC07GF474J (RC07GF104J)
R2	RC07GF473J (RC07GF682J)
R3	RC07GF223J
R4	22502 (BEC)
R5	RC07GF153J
R6	RT11C2L102
R7	RC07GF333J
R8	22500 (BEC)
R9	RC07GF102J
R10	RC07GF332J
R11	RT11C2L502
R12	RC07GF182J
R13	RC07GF333J
R14	RC07GF222J
R15	RC20GF181J
R16	RC07GF101J
R17	RC07GF472J
R18	RT11C2L501
R19	RC07GF332J
R20	RC07GF103J
R21	RC07GF242J
R22	RT11C2L501
R23	RC07GF222J
R24	MS35044-86
R25	RC07GF473J
R26	RC07GF101J
R27	Selected +5%, 1/4w
*R29	RC07GF473J
*R30	RC07GF202J

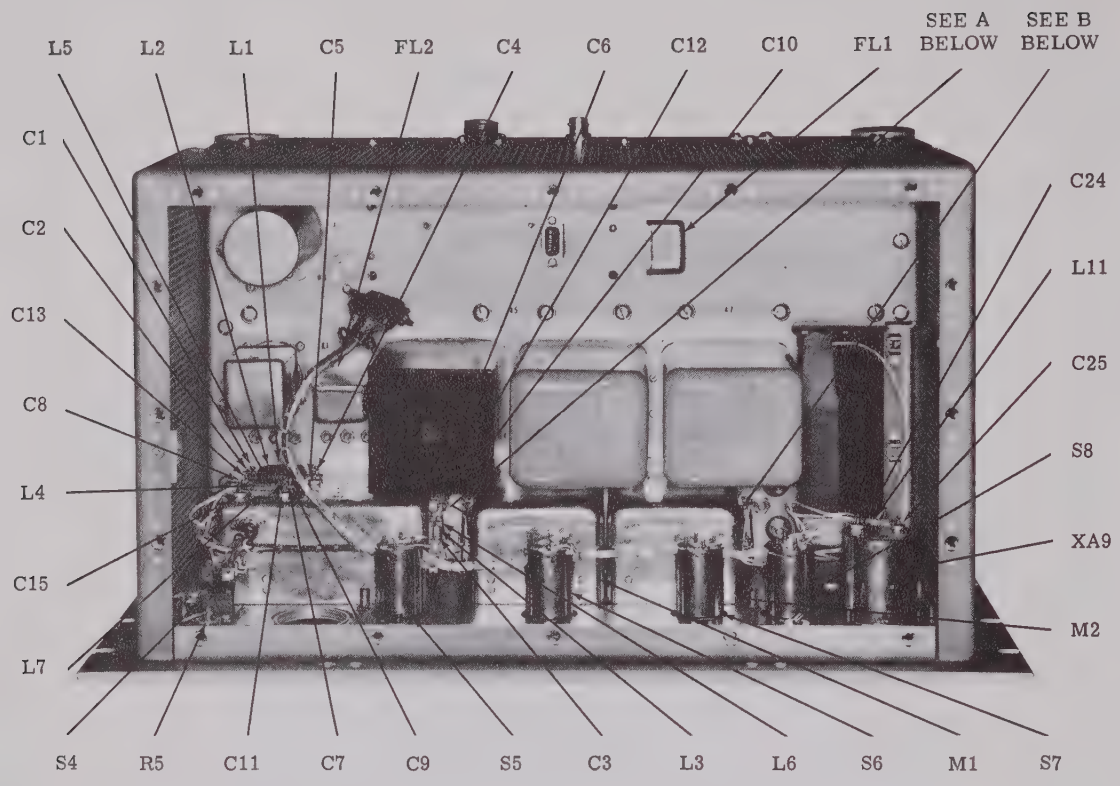
Discriminator, Oscillator - Amplifier, A5 (Figure 14)

A6	22526-1 (BEC)
CR1	USN-1N914
CR2	USN-1N914
CR3	JAN-1N276
CR4	JAN-1N276
C1	CK06CW472M
C2	CM15F131JN3
C3	22004-1 (BEC)
C4	22531 (BEC)
C5	CK06CW472M
C6	CK05CW151K
C7	CK05CW561K
C8	22531 (BEC)
C9	CM15B100KN3
C10	CK05CW102K
C11	22531 (BEC)
C12	CK63AW103K
C13	CM15F121JN3
C14	CK06CW472M
C15	CK60AW152M
C16	CK06CW103M
C17	CK06CW472M
C18	CL44BJ050MP3
C19	CK05CW560K
C20	CM15C390JN3
C21	22531 (BEC)
C22	CK06CW472M
C23	CL44BD200MP3
C24	CM15C470JN3
C25	CM15C470JN3
C26	CC50CH050D
FL1	22586 (BEC)
J1	22503-1
J3	MS35179-1094A/U
J4	MS35179-1094A/U
L1	113910 (BEC)
L2 thru L5	113845 (BEC)
L6	22508 (BEC)
Q1 thru Q4	JAN-2N706
R1	RC07GF103J
R2	RC07GF242J
R3	RC07GF391J
R4	RC07GF562J
R5	RC07GF471J
R6	RC07GF224J
R7	RC07GF103J
R8	RC07GF242J
R9	RC07GF102J
R10	RC07GF391J
R11	RC07GF102J
R12	RC07GF561J
R13	RC07GF222J
R14	RC07GF103J
R15	RC07GF242J
R16	RC07GF102J
R17	RC07GF472J
R18	RC07GF332J
R19	RC07GF332J
R20	RC07GF103J
R21	RC07GF102J
T1	113907 (BEC)
J2	TS101P01
Y1	CR27A/U (6.10000 mc)

PARTS LIST (CONT)

R-f Amplifier, A10 (Figures 15 and 16)

CR1 thru CR5	JAN-IN276
CR6	22510 (BEC)
CR7	JAN-IN21WE
C1 thru C10	22531 (BEC)
C12 thru C17	22531 (BEC)
C18	CP04A3KC473K3
C19	22531 (BEC)
C20	CP04A3KC473K3
C21 thru C23	22531 (BEC)
C24	CP04A3KC473K3
C25 thru C27	22531 (BEC)
C28	CK70AW102M
C29	22531 (BEC)
C30	22532 (BEC)
C31	CM15E330JN3
C32	22532 (BEC)
C33	20550-3
C34	CK60BX4R7K
C35	22532 (BEC)
C36	CM15E161JN3
C37	CM15E201JN3
C38	20550-2 (BEC)
C39	22529 (BEC)
C40	CM15E201JN3
C41	22532 (BEC)
C42	20550-2 (BEC)
C43	22501 (BEC)
C44	22529 (BEC)
C45	CM15E471JN3
C46	22501 (BEC)
C47	20550-2 (BEC)
C48	22501 (BEC)
C49	22529 (BEC)
C50	CM15E471JN3
C51	22501 (BEC)
C52	20550-2 (BEC)
C53	22501 (BEC)
C54	22529 (BEC)
C55	CM15E471JN3
C56	22501 (BEC)
C57	20550-2 (BEC)
C58	22529 (BEC)
C59	CM15E471JN3
C60	22501 (BEC)
C61	20550-2 (BEC)
C62	22529 (BEC)
C63	CK80AW152M
C64	CK80AW152M
C65	CK80AW152M
C66	20550-2 (BEC)
C67	CM15E470IN3
C68	1138-2 (BEC)
C69	1138-2 (BEC)
J1	22503-2 (BEC)
J2	MS 35174-290A
J3	UG58A/U
L1	MS16225-14
L2	MS16225-14
L3	MS16225-14
L4	MS16225-14
L5	MS16225-14
L6	MS16225-22
L7	MS16225-14
L8	MS16225-14
L9	113845 (BEC)
L10	MS16225-14
L11	MS16225-14
L12	MS16225-5
L13	MS16225-14
L14	MS16225-5
L15	113972-1 (BEC)
L16	MS16225-14
L18	MS16225-14
L19	113972-2 (BEC)
L20	MS16225-14
L21	113972-3 (BEC)
L22	MS16225-14
L23	113972-4 (BEC)
L24	MS16225-14
L25	113972-5 (BEC)
L26	MS16225-14
L27	113972-6 (BEC)
L28	MS16225-14
L29	113972-7 (BEC)
L30	MS16225-14
L31	113972-8 (BEC)
L32	113721 (BEC)
L33	114246 (BEC)
Q1	22512 (BEC)
Q2	22608 (BEC)
Q3	22512 (BEC)
Q4	22512 (BEC)
Q5	22512 (BEC)
Q6	22512 (BEC)
Q7	22511 (BEC)
R1	MS35043-94
R2	MS35043-81
R3	RV6LAYSD252A
R4	RC07GF153J
R5	RC07GF472J
R6	RE70G35R7
R7	RC07GF223J
R8	RC07GF152J
R9	RC07GF561J
R10	RC07GF154J
R11	RC07GF221J
R12	RC07GF102J
R13	RC07GF223J
R14	RC07GF242J
R15	RC07GF391J
R16	RC07GF223J
R17	RC07GF222J
R18	RC07GF510J
R19	RC07GF223J
R20	RC07GF222J
R21	RC07GF100J
R22	RC07GF223J
R23	RC07GF222J
R24	RC07GF223J
R25	RC07GF221J
R26	RC07GF100J
R27	RC07GF223J
R28	RC07GF222J
R29	MS35045-47
R30	Selected from 22K to 47K RC07GF...J
R31	RN60B51R1F
R32	RC20GF221J
R33	RN60B37R4F
R34	RN60B1500F
R35	RN60B1500F
R36	RC07GF100J
S1	MS16109-36-2-2N
XY1	20549 (BEC)



L8 UNDER L6
C14 UNDER C3
C16 UNDER C14

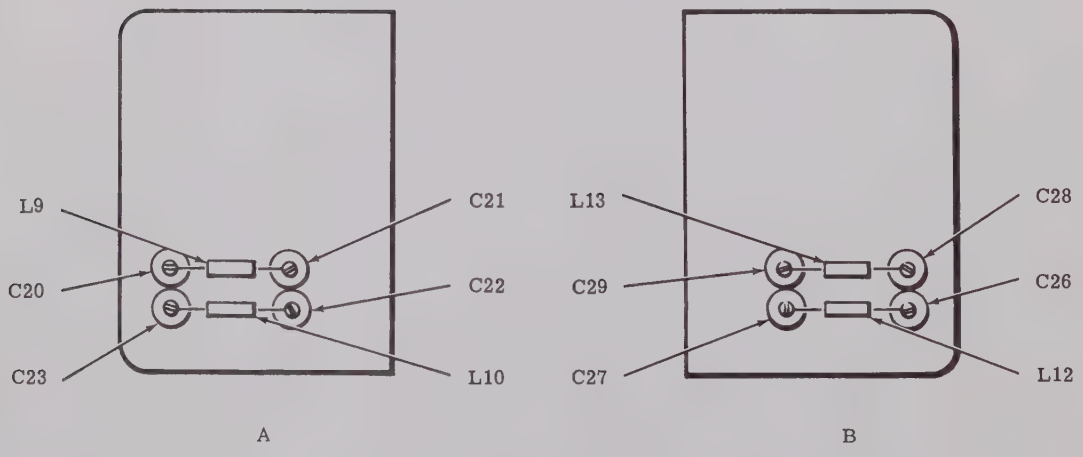


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Figure 8. Main Chassis Components (Bottom View).

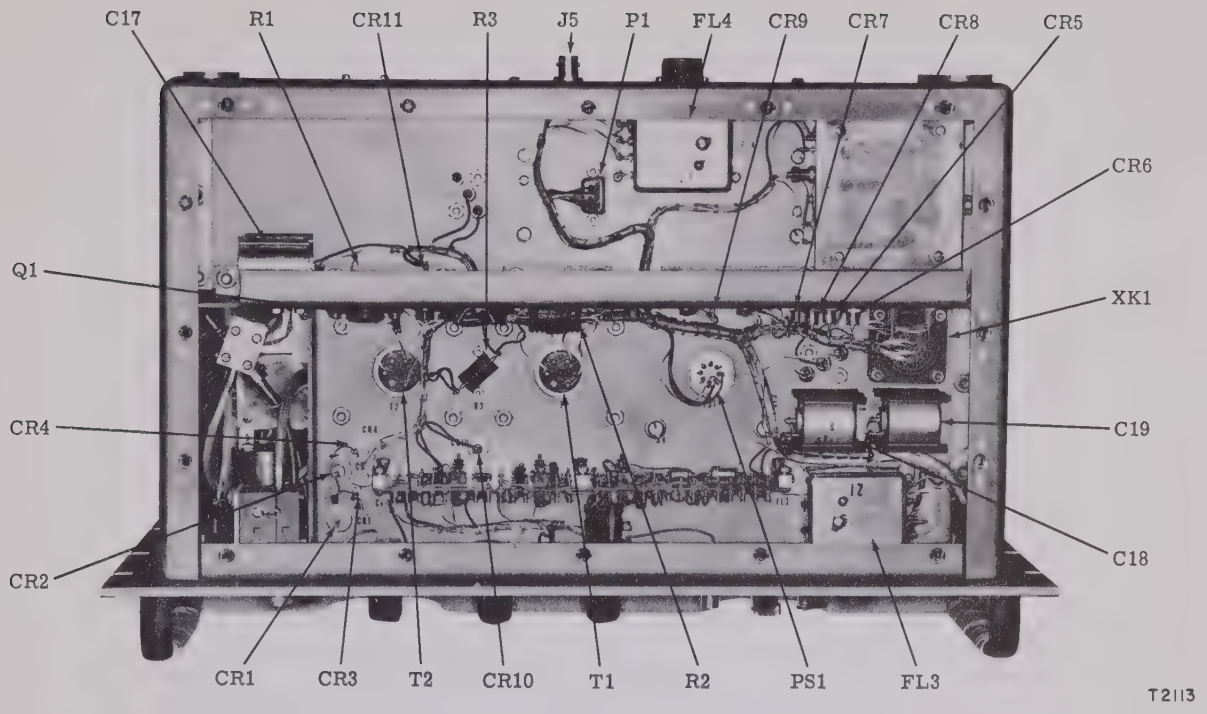


Figure 9. Main Chassis Components (Top View).

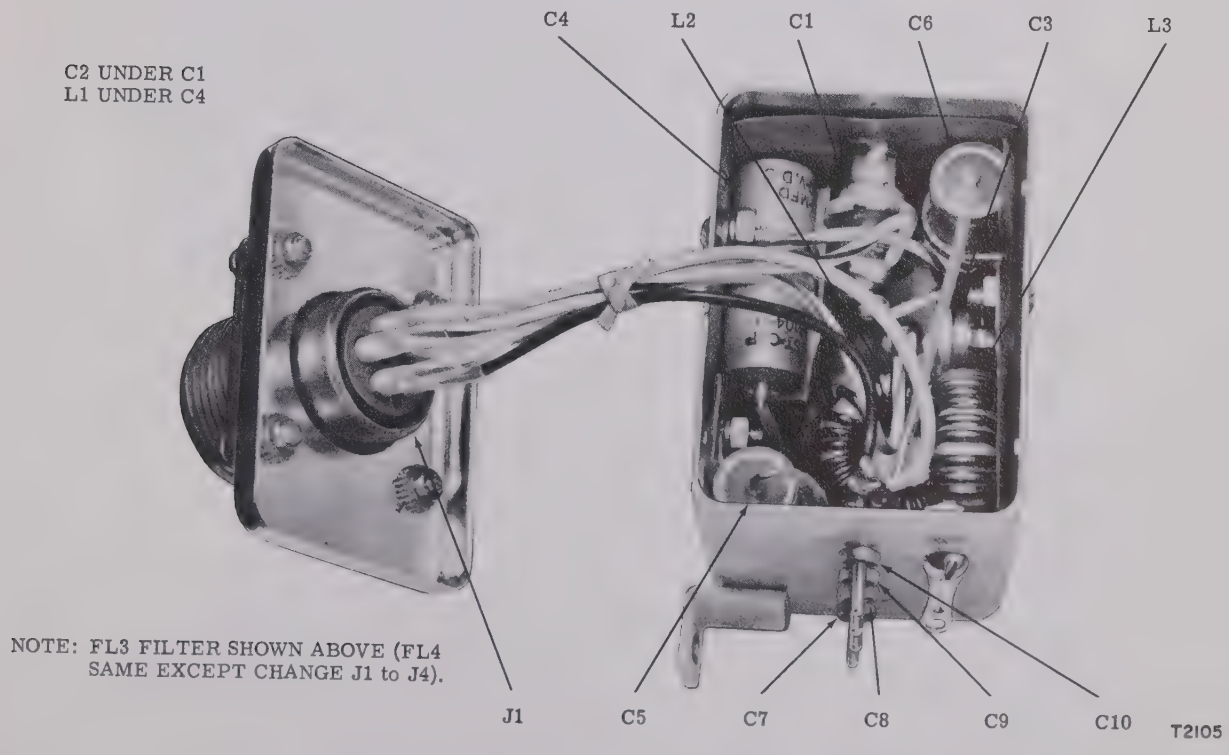


Figure 10. Primary Power Radio Interference Filters (A1FL3, A1FL4).

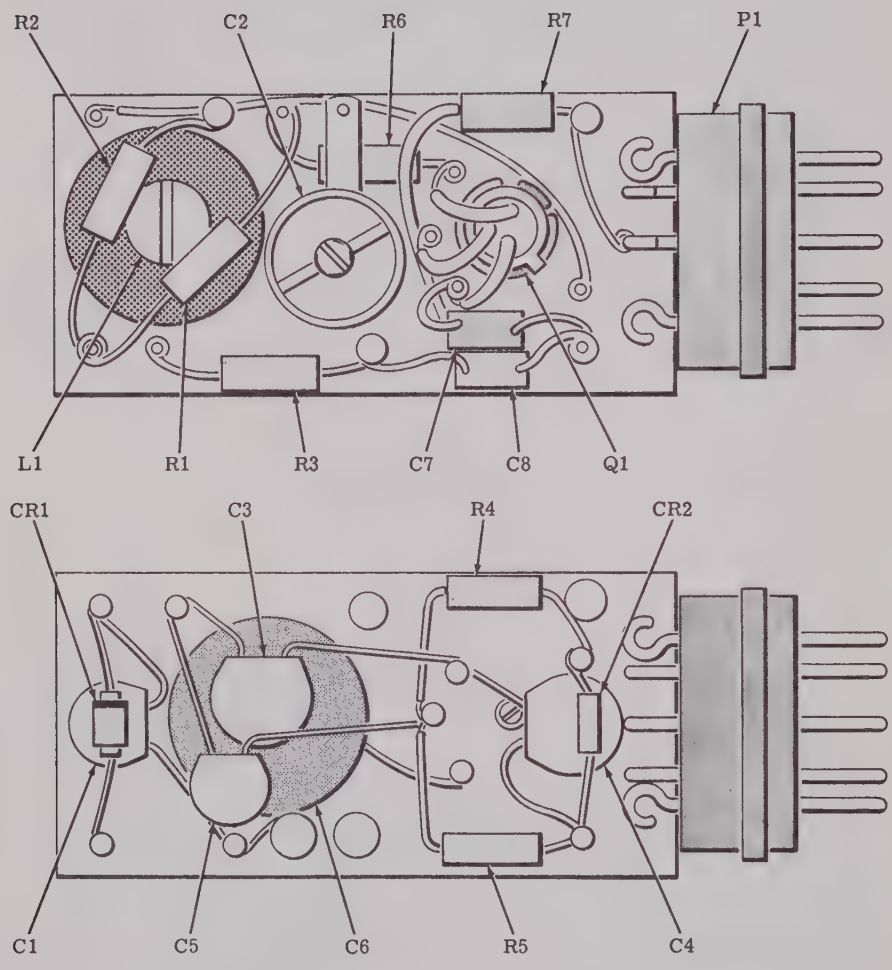


Figure 11. R-f Oscillator-6.1 mc (A2).

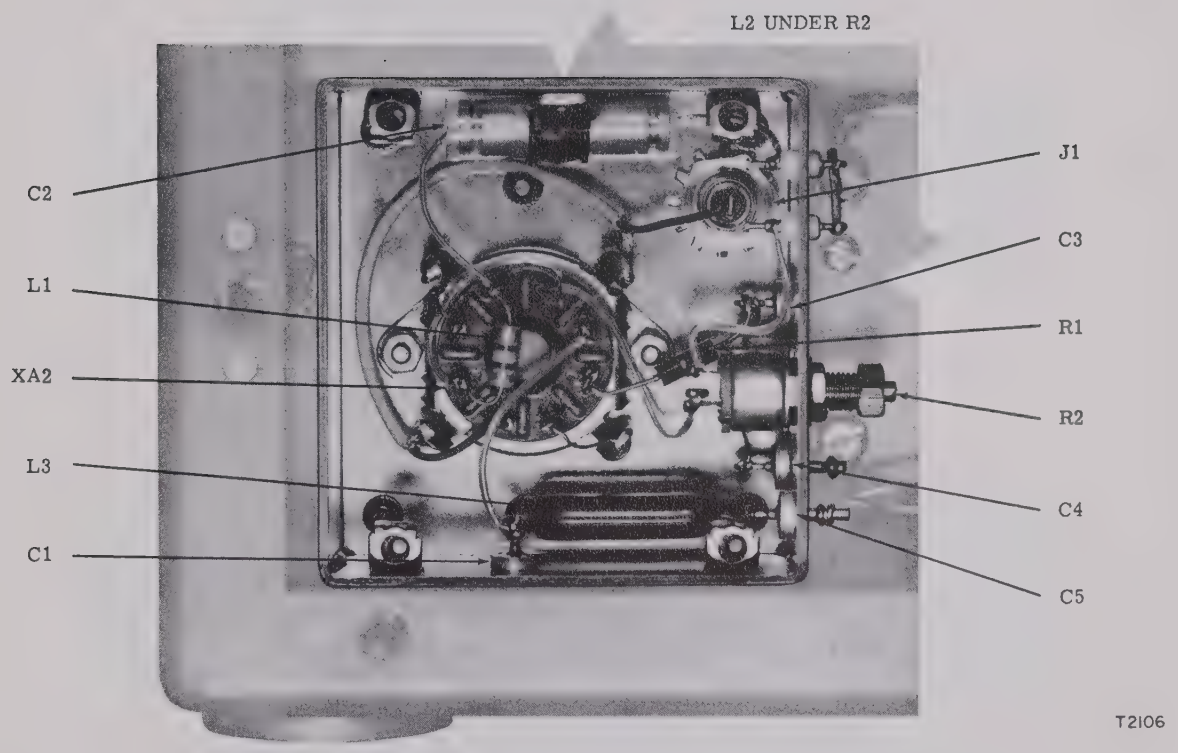
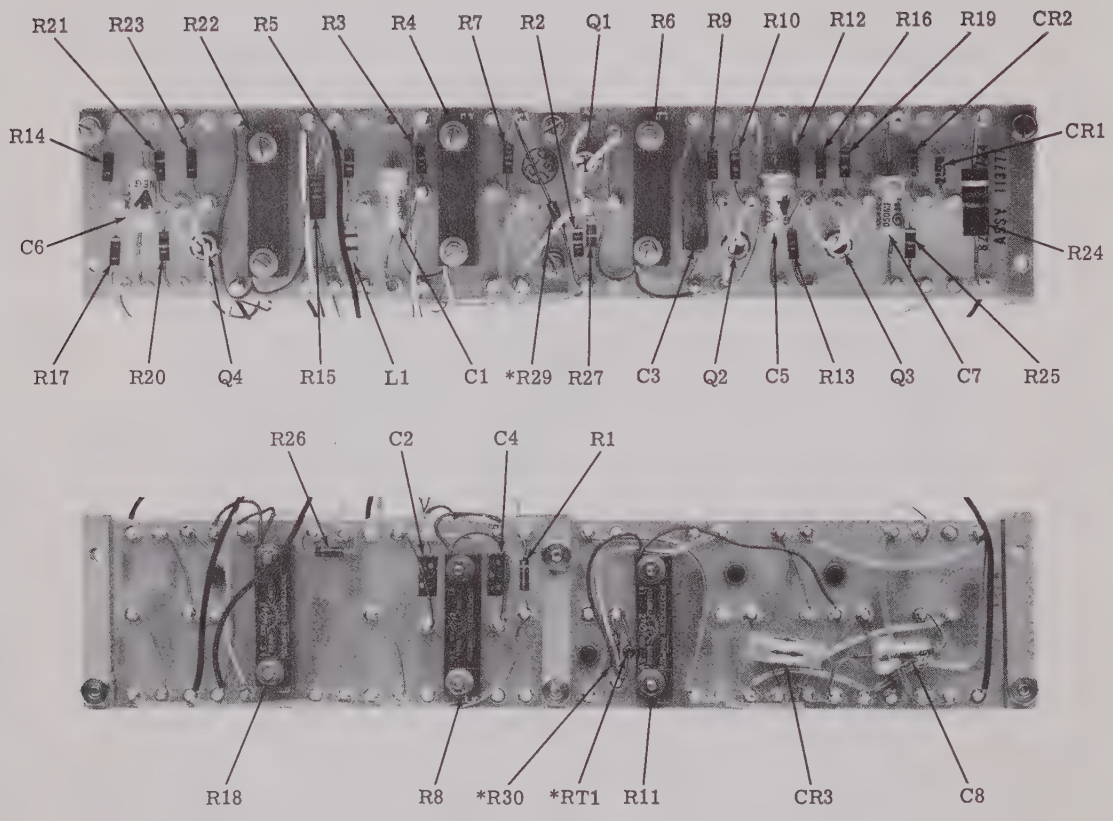


Figure 12. Oscillator Mounting Assembly (A3)



* ADDED FOR SERIAL Nos. 13 AND ABOVE.

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Figure 13. Meter Amplifier Component Assembly Board (A4).

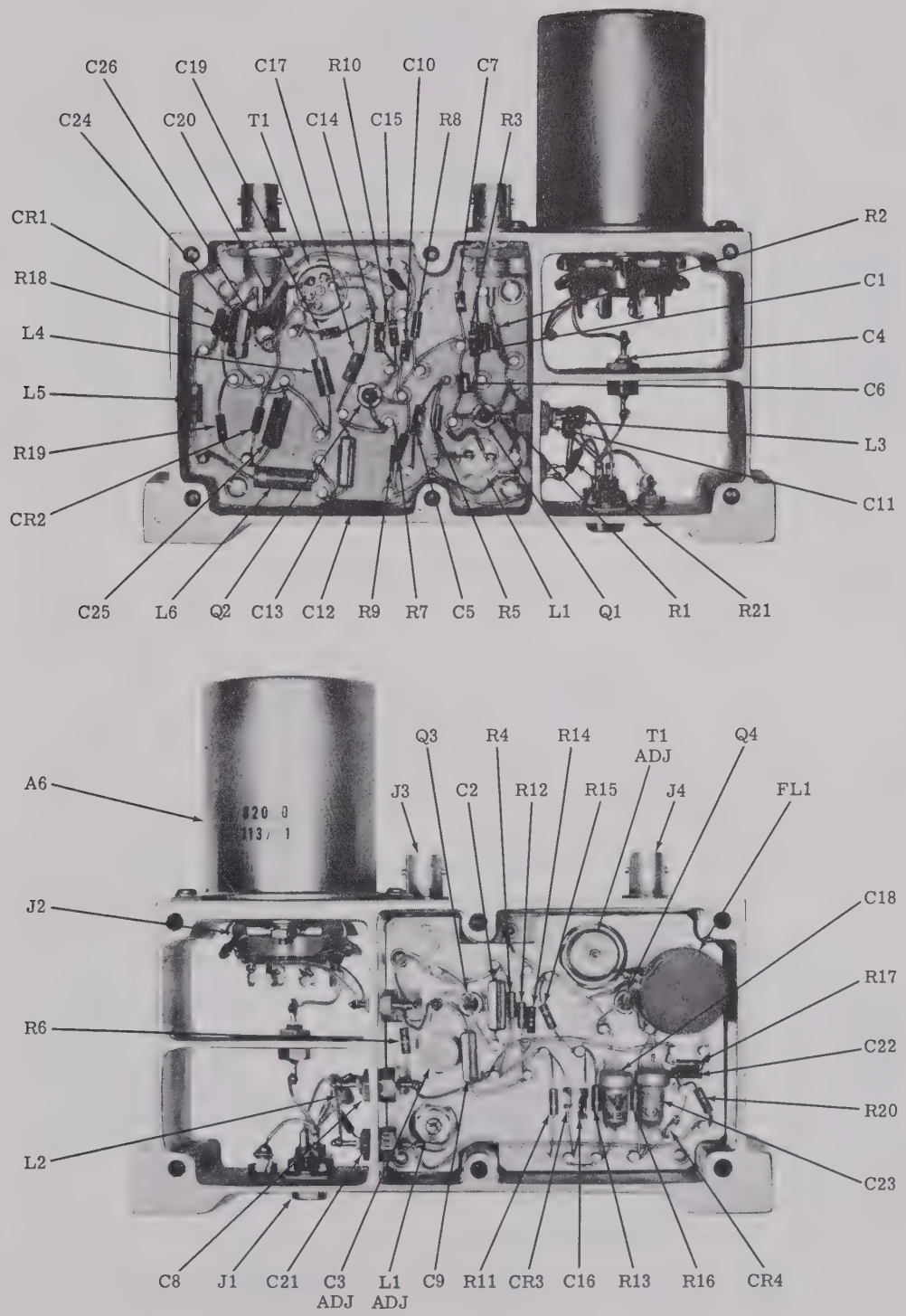


Figure 14. Discriminator Oscillator-Amplifier (A5).

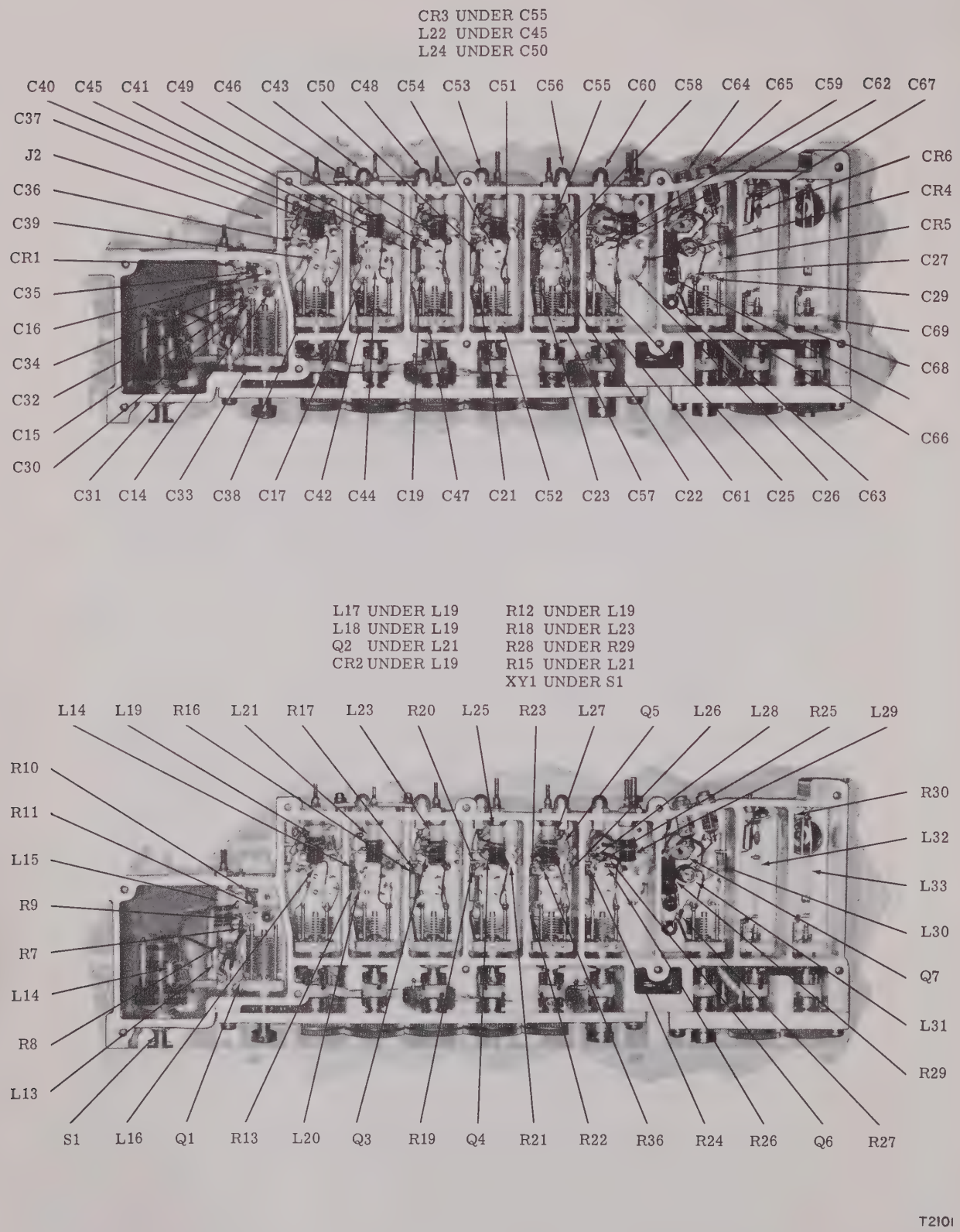
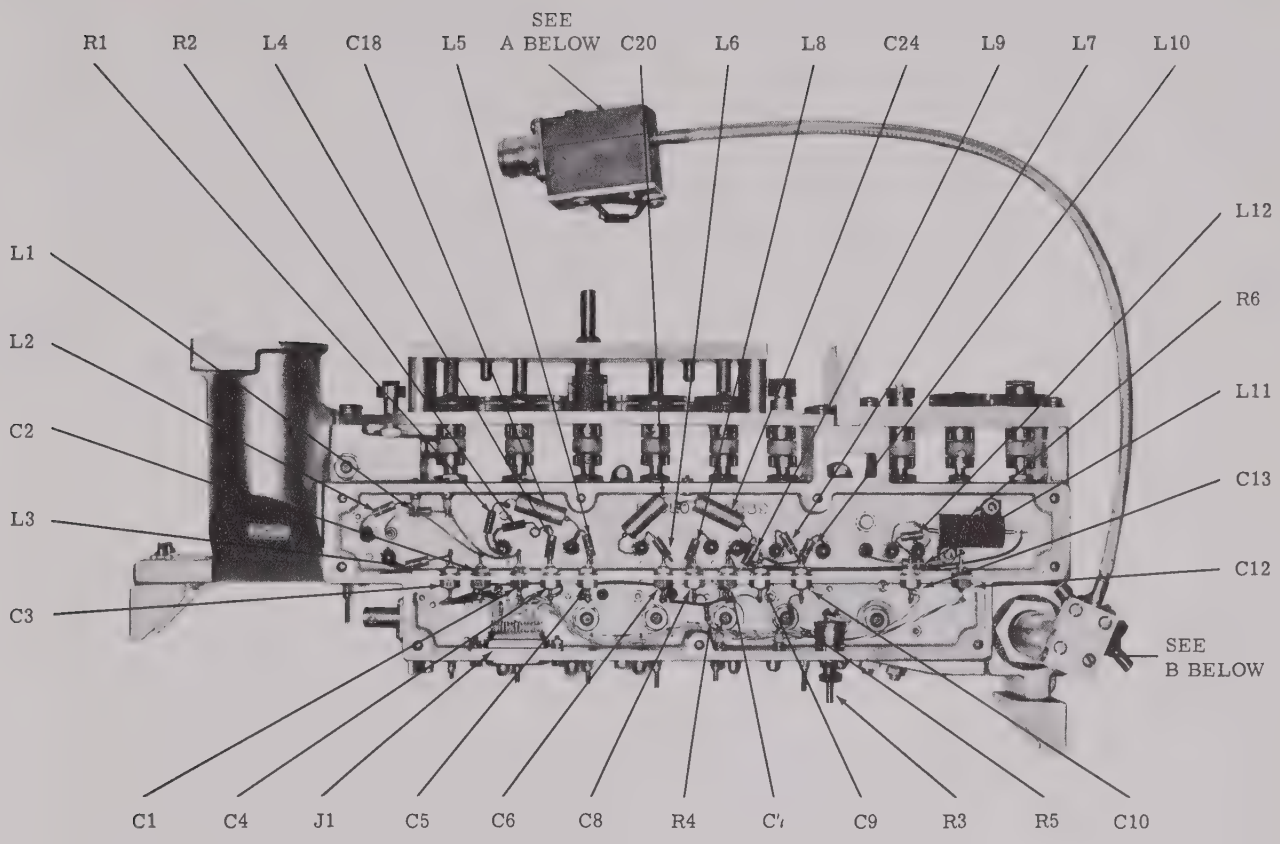


Figure 15. R-f Amplifier (A10) (Top View).



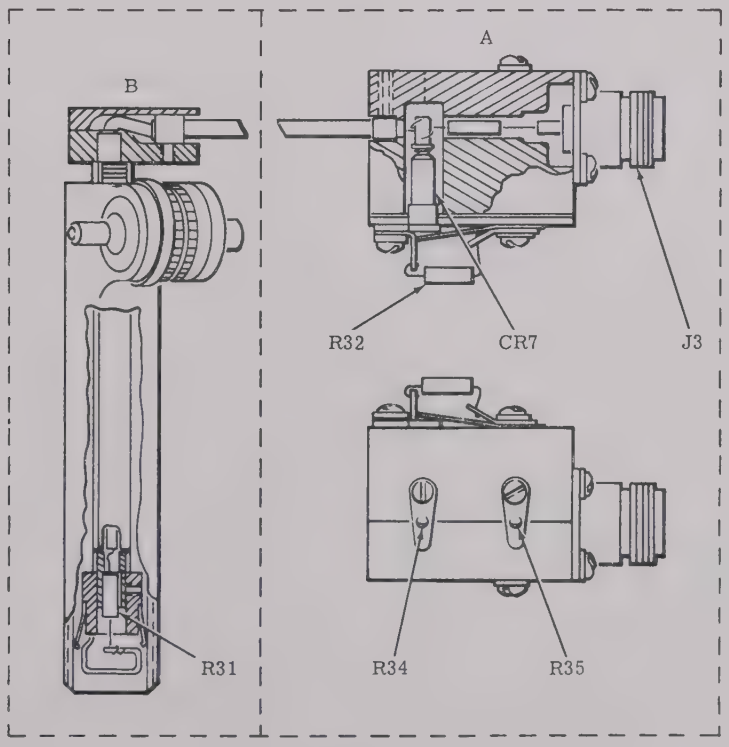


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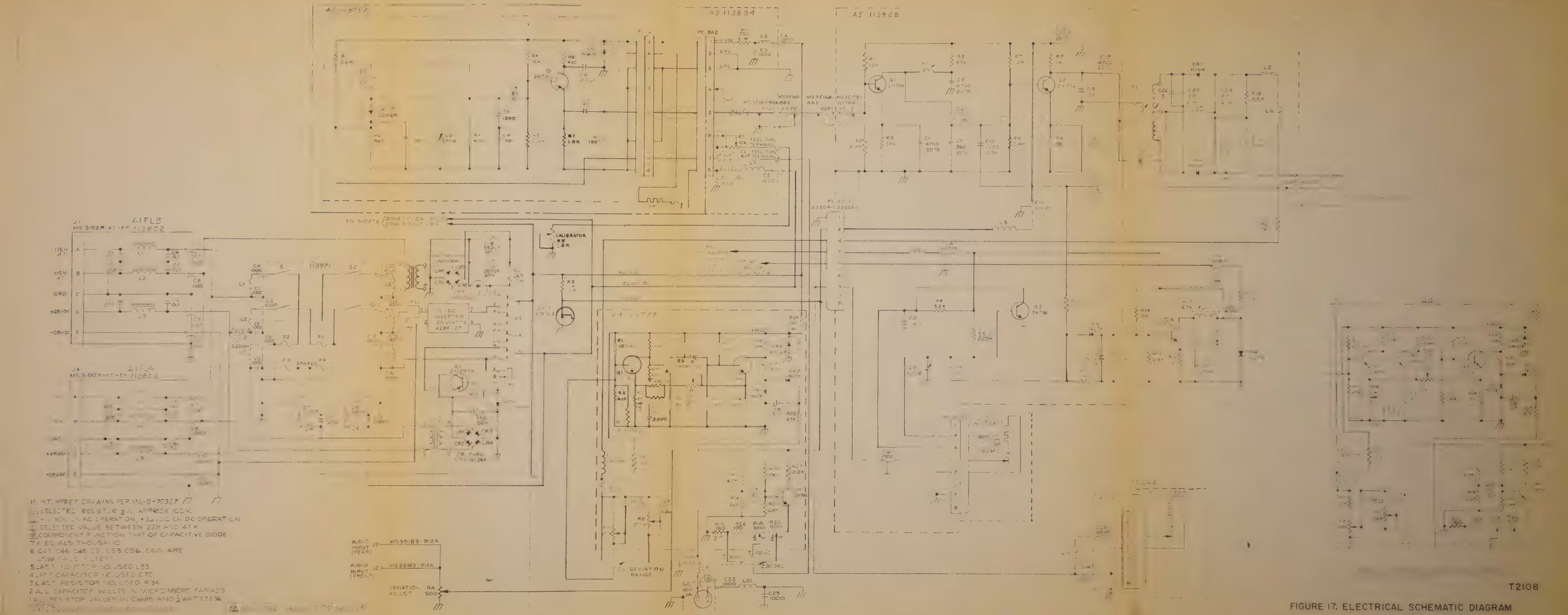
Figure 16. R-f Amplifier (A10) (Bottom View).



12. INTERPRET DRAWING PER MIL-D-70327
11. SELECTED RESISTOR ±1%, APPROX 100K
10. FOR 115V AC OPERATION, +28 VDC ON DC OPERATION
9. SELECTED VALUE BETWEEN 22K AND 47K
8. COMPONENT FUNCTION THAT OF CAPACITIVE DIODE
7. K EQUALS THOUSAND
6. C43 C46 C48 C51 C53 C56 C60 ARE LOW PASS FILTER
5. LAST NUMBER NO. USED L33
4. LAST CAPACITOR NO. USED C76
3. LAST RESISTOR NO. USED R36
2. ALL CAPACITOR VALUES IN MICROMICRO FARADS
1. ALL RESISTOR VALUES IN OHMS AND ¼ WATT ±5%

FIGURE 17. ELECTRICAL SCHEMATIC DIAGRAM
(SHEET 1 OF 2)

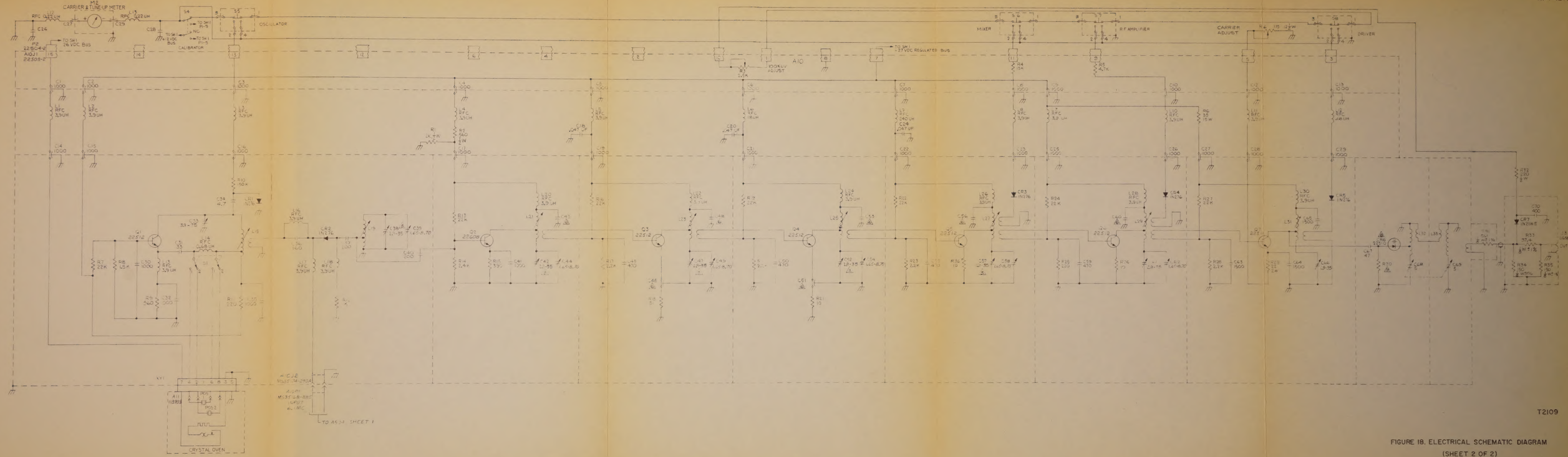


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FIGURE 18. ELECTRICAL SCHEMATIC DIAGRAM
(SHEET 2 OF 2)

BABCOCK ELECTRONICS CORPORATION

AEROSPACE DIVISION	*1640 Monrovia Avenue, Costa Mesa, California* *Phone: (714) 548-0611 TWX: (714) 642-1331*
RELAYS DIVISION	*3501 Harbor Blvd., Costa Mesa, California* *Phone: (714) 546-2711 TWX: (714) 546-0445*
ORLANDO DIVISION	*2525 West Shader Road, Orlando, Florida* *Phone: (305) 295-2410 TWX: (305) 275-1491*
WASHINGTON OFFICE	*1712 Eye Street, N.W., Suite 802, Washington, D.C.* *Phone: (202) 298-6880 TWX: (202) 965-0482*
HUNTSVILLE OFFICE	*Sahara Office Park, Suite 120, Huntsville, Alabama* *Phone: (205) 881-3780*